United States
Department of
Agriculture

Soil
Conservation
Service

In cooperation with
the University of Florida,
Institute of Food and
Agricultural Sciences,
Agricultural Experiment
Stations, and Soil
Science Department; and
the Florida Department of
Agriculture and Consumer
Services

Soil Survey of Sarasota County, Florida

How To Use This Soil Survey

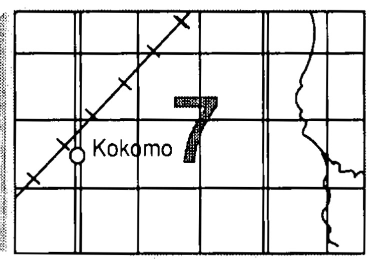
General Soil Map

The general soil map, which is the color map preceding the detailed soil maps, shows the survey area divided into groups of associated soils called general soil map units. This map is useful in planning the use and management of large areas.

To find information about your area of interest, locate that area on the map, identify the name of the map unit in the area on the color-coded map legend, then refer to the section **General Soil Map Units** for a general description of the soils in your area.

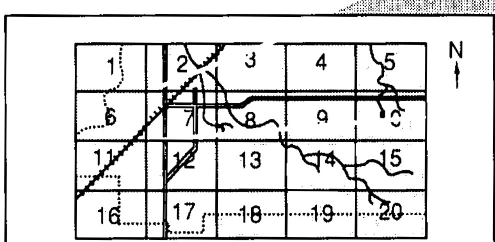
Detailed Soil Maps

The detailed soil maps follow the general soil map. These maps can be useful in planning the use and management of small areas.



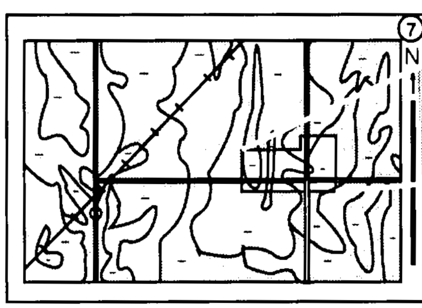
MAP SHEET

To find information about your area of interest, locate that area on the **Index to Map Sheets**, which precedes the soil maps. Note the number of the map sheet, and turn to that sheet.



INDEX TO MAP SHEETS

Locate your area of interest on the map sheet. Note the map unit symbols that are in that area. Turn to the **Index to Map Units** (see Contents), which lists the map units by symbol and name and shows the page where each map unit is described.



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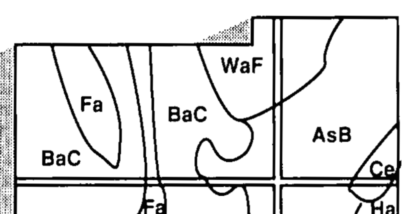

AREA OF INTEREST

NOTE: Map unit symbols in a soil survey may consist only of numbers or letters, or they may be a combination of numbers and letters.

The **Summary of Tables** shows which table has data on a specific land use for each detailed soil map unit. See **Contents** for sections of this publication that may address your specific needs.

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other federal agencies, state agencies including the Agricultural Experiment Stations, and local agencies. The Soil Conservation Service has leadership for the federal part of the National Cooperative Soil Survey.

Major fieldwork for this soil survey was completed in 1984. Soil names and descriptions were approved in 1987. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1987. This soil survey was made cooperatively by the Soil Conservation Service; the University of Florida, Institute of Food and Agricultural Sciences, Agricultural Experiment Stations, and Soil Science Department; and the Florida Department of Agriculture and Consumer Services. It is part of the technical assistance furnished to the Sarasota County Soil and Water Conservation District. The Sarasota County Board of Commissioners contributed funds to accelerate the completion of the survey.

Cover: Urban and residential areas and beaches adjacent to the Gulf of Mexico. Tourism and retirement living are important industries in Sarasota County. Photo courtesy of the Florida Division of Tourism.

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Issued September 1991

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Summary of Tables

Foreword

This soil survey contains information that can be used in land-planning programs in Sarasota County. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

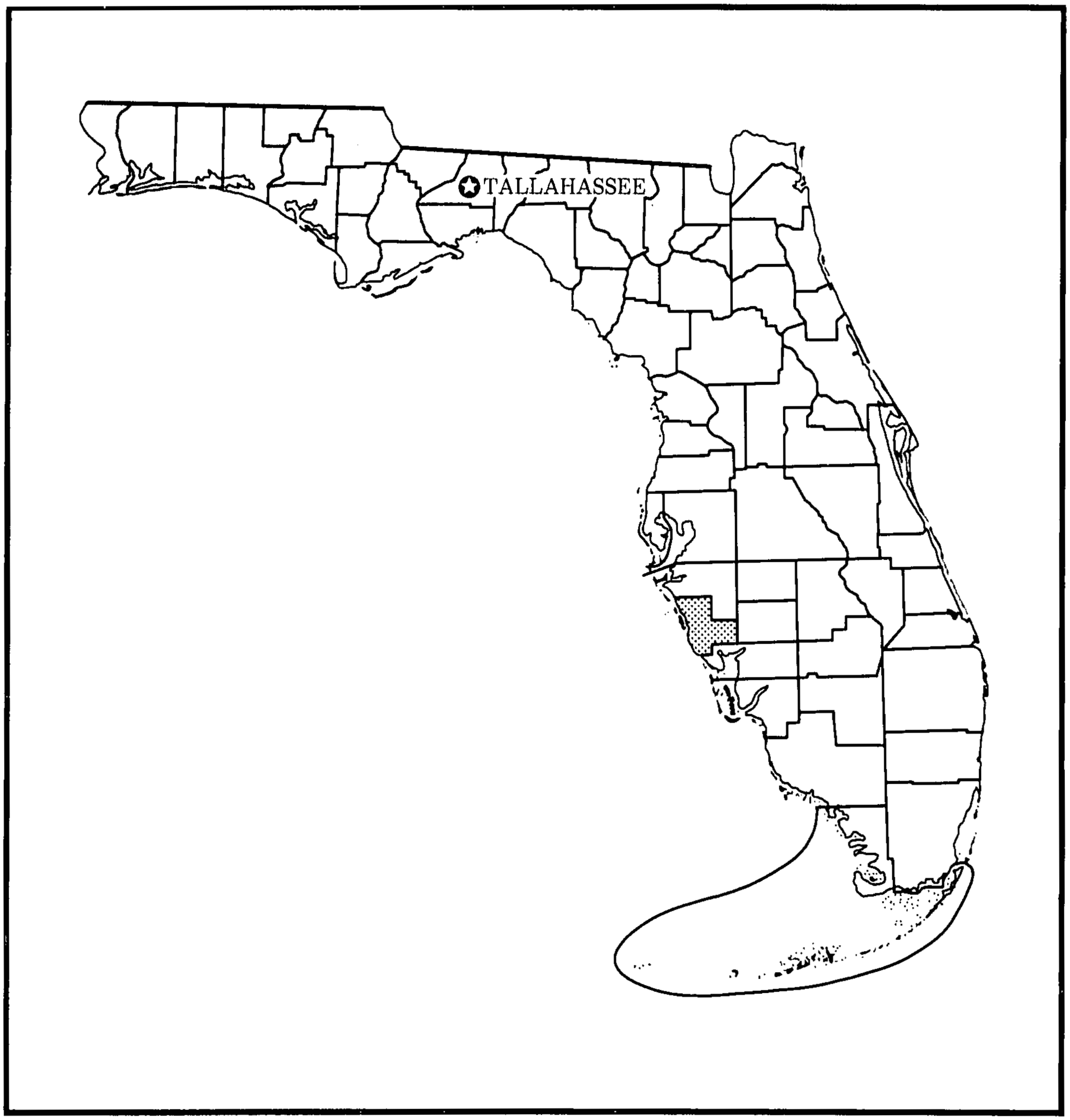
This soil survey is designed for many different users. Farmers, ranchers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to ensure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are moderately deep over bedrock. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to septic tank absorption fields. A high water table makes a soil poorly suited to underground development.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at the local office of the Soil Conservation Service or the Cooperative Extension Service.

Niles Glasgow

T. Niles Glasgow
State Conservationist
Soil Conservation Service



Location of Sarasota County in Florida.

Soil Survey of Sarasota County, Florida

By Adam G. Hyde, G. Wade Hurt, and Carol A. Wettstein, Soil Conservation Service

Soils surveyed by Robert Wildermuth and Joseph L. Huber, Soil Conservation Service; Ralph G. Leighty, Soil Conservation Service and University of Florida, Agricultural Experiment Stations; and Orlando E. Cruz, Victor W. Carlisle, and James H. Walker, University of Florida, Agricultural Experiment Stations

Soils recorrelated by Adam G. Hyde, G. Wade Hurt, and DeWayne Williams, Soil Conservation Service

United States Department of Agriculture, Soil Conservation Service,
in cooperation with
the University of Florida, Institute of Food and Agricultural Sciences, Agricultural Experiment Stations, and Soil Science Department; and the Florida Department of Agriculture and Consumer Services

Sarasota County is in the southwestern part of the peninsula of Florida. It is bordered on the west by the Gulf of Mexico, on the north by Manatee County, on the east by Manatee and De Soto Counties, and on the south by Charlotte County. Sarasota County has a land area of 366,810 acres, or about 573 square miles. An additional 13,530 acres of water is within the boundaries of the county. Along the coast is a string of barrier islands. These are the southern portion of Longboat Key, Lido Key, Siesta Key, Casey Key, and Manasota Key. They are separated from the mainland by shallow bays. Urban areas are on the coast, along U.S. Highway 41, which generally extends from north to south. Sarasota, the county seat, is the largest of the incorporated cities. It is on the coast.

Interstate 75 separates the urban areas from the rural areas. This major highway parallels U.S. Highway 41. The rural areas are characterized by open rangeland, small areas of woodland, citrus groves, cropland, pasture, and areas of native habitat.

Tourism has been an important factor in the urban development of Sarasota County. A favorable subtropical climate and the location on the gulf attracts both tourists and retirees from all over the world. As a result, the county is one of the fastest urbanizing counties in the nation. Sarasota is a well known resort. Its population during the tourist season, which runs from October through April, is about double that in summer.

This soil survey updates the survey of Sarasota County published in 1959 *(18)*. It describes the soils to a greater depth. Many of the series and map unit names have been changed because of new information about the soils. Though some soil boundaries have been adjusted, most are essentially the same as those in the older survey.

General Nature of the County

In this section the environmental and cultural factors that affect the use and management of the soils in Sarasota County are described. These factors are climate; history; physiography, drainage, and stratigraphy; water supply; agriculture; transportation facilities; and recreation.

Climate

The climate of Sarasota County is oceanic and subtropical. The temperature is influenced by latitude, low elevation, winds that sweep across the peninsula, and the proximity to the Gulf of Mexico. The climate is characterized by high relative humidity, short mild winters, long warm summers, and rainfall that is abundant throughout the year but is heaviest from June through September.

The climate is tempered by the Gulf of Mexico and landlocked bays, rivers, and creeks. The bodies of water protect the county from frost in winter. Thus, vegetables and citrus fruit can be grown.

Monthly and annual temperature and precipitation data are shown in table 1 *(22)*. The table shows data from Bradenton and Punta Gorda, Florida. These data indicate conditions that can be expected in Sarasota County.

Temperatures above 95 degrees F occur frequently in summer. Such temperatures are of short duration because thunderstorms, which usually occur in the afternoon, quickly cool the air. Temperatures fall below the freezing point once or twice a year, generally in the eastern part of the county. Frost records kept at Bradenton over a 40-year period indicate that the latest killing frost in spring occurred on March 25 and that the earliest one in autumn occurred on November 18. There were 13 years with no killing frost in spring and 21 years with none in autumn.

Some areas near bodies of water are frost free the year round. The soils in these areas are suited to gladiolus for bulbs and cut flowers. Also, tomatoes, cabbage, peppers, escarole, lettuce, cucumbers, eggplant, and celery are grown in winter and in most years are not damaged by frost. Grazing of native grasses and of most of the improved pastures continues throughout the year. Shelter for livestock generally is not needed. During occasional cold spells, fires are used to prevent damage to trees and fruit in citrus groves. Firing of the groves is seldom necessary, however, because damaging freezes, which occur when temperatures fall to 28 degrees F or lower, occur only once or twice every 5 to 10 years.

The seasonal distribution of rainfall is generally uniform. During periods of drought, which generally occur in spring, irrigation is used to prevent crop damage. Winter precipitation generally occurs as a slow, steady drizzle.

During September and early October, hurricanes are likely to form in the area of the Caribbean Sea. There is generally one severe hurricane a year, and about one in five strikes the peninsula of Florida. When a hurricane occurs, the accompanying rains damage crops as much as or more than the wind.

History

The earliest evidence of human habitation in Sarasota County dates back to more than 10,000 years ago. Archaeological evidence at Warm Mineral Springs and Little Salt Springs shows that Indian tribes in the survey area depended on large game for survival *(12)*. Later, as these food sources may have become more scarce inland, these people turned to marine life for food. Most of the prehistoric people, however, settled along the shoreline, in areas where coastal streams entered the bays. Food was most plentiful in these areas.

Well into historic times, Sarasota County remained unsettled because of hostile Indians, infertile soil, poor drainage, and frequent storms. The first Spanish explorer known to have visited the survey area was Hernando de Soto, who landed on Longboat Key on July 9, 1539. The Spanish explorers did not stay because they found no gold. Diseases brought over by the Europeans wiped out the original Indians. Wars between the Seminoles and the American military pushed the Indians into the Everglades before they could resettle in the survey area. For many years after 1842, only a few fishermen settled in the area to harvest the rich marine resources.

The Armed Occupation Act of 1842 opened the Sarasota area to settlement. By the end of the Civil War, small communities began to form along the coastline. The early settlers built first in the areas of well drained soils. The first post office in the survey area was established on August 16, 1878. It was named Sara Sota. A group of Scotch colonists who arrived in 1885 made the first major attempt to develop Sarasota. In 1920, the town was incorporated. Bee Ridge, Fruitville, and Myakka were established between 1867 and 1883. The communities of Sara Sota and Bee Ridge were located in the higher, drier areas. Fruitville developed because of the rich organic mucks to the east. The community of Myakka was established on the better drained soils in the valley of the Myakka River. Sarasota County was established by the State Legislature on May 14, 1921.

In 1950, the population of the county was 28,827. By 1970, it had increased to 120,413. Between 1970 and 1978, it increased by more than 52 percent. In 1980, it was 197,500. It is expected to be 254,500 by 1990 and 295,900 by the year 2000 *(12)*.

Physiography, Drainage, and Stratigraphy

Kenneth M. Campbell, professional geologist, Florida Geological Survey, prepared this section.

The paragraphs that follow describe the physiography, drainage, and stratigraphy in the county.

Physiography

Nearly all of Sarasota County is in the Gulf Coastal Lowlands *(23)*. Two small areas in the northeastern part of the county are within the boundaries of the De Soto Plain. Barrier islands and lagoons are along most of the gulf coast in the county.

Elevations range from mean sea level along the gulf coast and the lower reaches of the Myakka River to a maximum of about 100 feet above sea level in the extreme northeastern part of the county, directly south of Verna. Elevations increase almost imperceptibly from the west and southwest toward the northeast. The topography tends to be flat. The steeper areas are in the vicinity of streams *(11)*.

The prominent topographic features of the Gulf Coastal Lowlands in Sarasota County are scarps and terraces that formed during Pleistocene sea level stands. Four terraces are in the county *(7)*. The Pamlico terrace is at elevations of about 8 to 25 feet above mean sea level, the Talbot terrace is at 25 to 42 feet, the Penholoway terrace is at 42 to 70 feet, and the Wicomico terrace is at 70 to 100 feet. The scarps that separate these terraces generally are poorly defined.

Except for the coast at Venice, the gulf coast in the county consists of barrier islands, spits, and lagoons. The barrier islands formed during the last 4,000 to 5,000 years, after sea level became reasonably stable. They represent the latest adjustment to changing conditions during this period. Barrier islands change size, shape, and position in response to both short-term and long-term conditions. They can be merged together, can be split into segments, can become attached to the mainland, or can even disappear completely. The method of formation and the original location may be obscured.

Barrier islands require an abundant supply of sand. Since the present sea level has stabilized, very little new sand has been added to the islands in this survey area. The result is that parts of the islands are being eroded. Most of the sand lost through erosion is redeposited as spits at the ends of the islands, in lagoons, or in offshore areas.

The De Soto Plain is a flat area that is mainly in Manatee, Hardee, De Soto, Highlands, Glades, and Charlotte Counties. Only a small part of the plain is in Sarasota County. It extends into the northeast corner of the county. That part of the plain in Sarasota County consists mainly of the relatively steeper slopes between the very edge of the plain and the inland edge of the Gulf Coastal Lowlands. The De Soto Plain is a submarine plain that probably formed under Wicomico seas, 70 to 100 feet above the present sea level *(23)*.

Drainage

Most of Sarasota County is poorly drained. Many swamps, marshes, and ponds are throughout the county. The Myakka River and its tributaries are the major streams. The county has numerous small streams. The county generally is an area of artesian flow *(8)*. The water table is at or near the surface throughout much of the county. Natural drainage systems have been channelized and extensive ditch systems constructed to improve drainage.

Stratigraphy

Sediments at or near the surface in Sarasota County consist of quartz sand, consolidated and unconsolidated shell beds, clay, limestone, and dolomite. These sediments range in age from Oligocene (38 to 22.5 million years ago) to Holocene (10,000 years ago to the present).

The Oligocene Series occurs as Suwannee Limestone in Sarasota County. This limestone is below the surface throughout the county. It is generally divided into two units.

The upper unit is creamy white to light yellowish gray limestone containing darker dolomitized zones *(11)*. The undolomitized parts are variably recrystallized packstone or wackestone that is poorly indurated to well indurated. The upper unit is highly fossiliferous, containing abundant poorly preserved foraminifera, mollusks, echinoids, and corals. Moldic and vuggy porosity is common.

The lower unit is generally pale gray to light yellow, calcilutitic limestone. It is typically softer, more calcilutitic, and less porous and fossiliferous than the upper unit and may contain finely divided pyrite *(11)*.

The top of the Suwannee Limestone is about 350 feet below mean sea level in the northeasternmost part of the county and dips to the south and west. In the southernmost part of the county, the top of the limestone is about 650 feet below mean sea level.

The Suwannee Limestone in Sarasota County ranges from about 150 to more than 350 feet in thickness. It is thinnest in the extreme southwestern part of the county and thickest in the vicinity of Sarasota and in the eastern part of the county *(11)*.

The Miocene Series in Sarasota County occurs as the Hawthorn Group, which consists of the Arcadia Formation and the overlying Peace River Formation. The Hawthorn Group has been raised from formation status to group status *(14)*. It includes those sediments that in the past have been included in the Tampa, Hawthorn, and Bone Valley Formations *(10, 11)*.

The Arcadia Formation in Sarasota County consists of the Tampa Member and an unnamed upper member *(14)*. The Tampa Member overlies the Suwannee Limestone and is lithologically similar to the typical Tampa Formation but has 1 to 3 percent phosphate and has greater areal limits *(14)*. The Tampa Member is white to tan, quartz sandy limestone that has a carbonate mud matrix. Varying amounts of clay generally are disseminated throughout the rock. Some of the beds contain more than 50 percent quartz sand. Dolomite is relatively uncommon. The Tampa Member is recognizable throughout most of the northern part of the county, but it becomes indistinct because of a facies change in the southern part of the county.

The upper member of the Arcadia Formation includes those sediments that in the past have been referred to as the "Hawthorn carbonate unit" *(14)*. Lithologically, these sediments consist of white to yellowish gray, quartz sandy, phosphatic, and sometimes clayey dolomite and limestone (uncommon). They have occasional beds of carbonate-rich quartz sand and thin clay beds.

The Arcadia Formation is below the surface throughout Sarasota County. The top of the formation is approximately at mean sea level in the northeastern part of the county to just over 100 feet below mean sea level in the southernmost part. The formation dips gently to the south-southeast. It ranges from about 300 feet to more than 500 feet in thickness. The thickness increases from the northeast and east to the west, southwest, and south *(14)*.

The Peace River Formation in Sarasota County consists of those sediments that have been described as "upper Hawthorn clastics" *(14)*. Lithologically, these sediments consist of yellowish gray to light olive green, interbedded phosphatic sands, clayey sands, clays, and dolomite stringers. The Peace River Formation is in all areas of the county, except for the immediate area of the city of Sarasota.

The top of the Peace River Formation is at or near mean sea level throughout much of the county. In the northeastern part of the county, however, it is 50 feet above mean sea level. The thickness of the formation ranges from 0 in the vicinity of Sarasota to 110 feet in the easternmost part of the county. The formation thickens to the east and south.

Surficial deposits of Pliocene-Pleistocene age (5.3 to 0.1 million years ago) blanket the county. Throughout most of the county, they consist of sandy, silty, and clayey, variably indurated shell beds overlain by a thin veneer of clean quartz sand. The deposits are typically 15 to 30 feet thick. The shell beds are not evident in the eastern and western parts of the northern third of the county *(11)*. The beds generally are 5 to 6 feet thick but range from 2 to 15 feet in thickness. They are commonly iron stained. An iron-cemented hardpan is common.

Clean quartz sand of Pleistocene age (1.6 to .01 million years ago) forms a veneer over the shell beds or over the Peace River Formation where the shell beds do not occur. These deposits consist of unconsolidated very fine to medium grained (1/16 to 1/2 millimeter) quartz sand. The sand is white to light brown and contains trace amounts of phosphate sand and limestone or shell fragments.

The clean quartz sand was deposited by Pleistocene seas at various sea levels. The scarps and terraces described under the heading "Physiography" formed in this sand. The maximum thickness of the surficial sand is 45 to 50 feet in the vicinity of Verna.

The Anastasia Formation, which is probably of late Pleistocene age, is evident at "Point of Rocks," Siesta Key. It forms a prominent outcrop that extends along the beach for about 1 mile. The outcrop occurs as case-hardened, bedded coquina consisting mainly of mollusk shells and fragments *(11)*. Wave action erodes and undercuts this material into large slabs. The resistance to wave erosion accounts for the prominent seaward projection of the coastline at this point.

Deposits of Holocene age (10,000 years ago to the present) are limited mainly to present-day flood plains along streams and to beaches, intertidal swamps and marshes, and inland swamps, marshes, and lakes. These sediments consist of sand, silt, clay, and organic material.

Water Supply

Water is one of the most important natural resources in Sarasota County. It is throughout the natural environment and can be classified into two systems: the ground water system and the surface water system *(12)*.

In the ground water system there are two types of geologic formations—the confined and the unconfined aquifers. The confined aquifer, called the Floridan Aquifer, extends under much of Florida. The Green Swamp region in Polk County is believed to be a recharge area for the part of the Floridan Aquifer that underlies Sarasota County. Except for this recharge area in Polk County, most of the Floridan Aquifer is under a confining layer of clay or other impermeable material. This confining layer is responsible for artesian water pressure. The Hawthorn Formation is the confining layer in Sarasota County.

The good quality of the water in the Floridan Aquifer is being threatened by pumping rates, which may exceed recharge rates. As this pumping occurs, the good-quality water is replaced by water of lesser quality from below. A number of wells in the southern part of the county have had a high saline content over the last few years.

Most users of potable and agricultural water in the county depend on the Floridan Aquifer as a primary source. Because of an increased demand for good-quality water, agricultural users are developing new water sources from the unconfined aquifer. Some are excavating reservoirs and depend on ground water recharge for most of their needs. Much of this recharge, however, depends heavily on rainfall, and most of the water used during the dry spring growing season is consumed faster than the recharge rate. When this rate of consumption occurs, wells fed from the Floridan Aquifer are pumped to recharge the reservoir.

Agriculture

Mild year-round temperatures, ample rainfall, abundant sunshine, long growing seasons, and responsive soils favor agriculture in Sarasota County. Citrus groves and various truck crops are among the products of the flourishing agricultural enterprises in the county. The livestock enterprise continues to be the principal agricultural activity in the county.

In 1983, about 28,400 acres in Sarasota County was cropland or improved pasture and 206,000 acres was native rangeland or woodland *(3)*. Celery and salad vegetables have been grown successfully on about 1,200 acres of organic soils in the Fruitville area. Tomatoes, cucumbers, cabbage, and watermelons are grown on about 500 acres in various parts of the county (fig. 1). Most of these are grown on leased land where the farmer clears the native vegetation from a field, drills a well for water, and then uses the field for two growing seasons. The field is then planted to improved pasture grasses. Because of escalating clearing costs, however, farmers are returning to fields that were cleared and farmed 4 or 5 years earlier.

Because of problems with pests, most of the soils in Sarasota County can be economically farmed only once in every 4 or 5 years. Corn and other crops used for silage have been successfully grown, and the extent of this kind of crop production appears to be increasing. The silage is supplied to one dairy in Sarasota County and to other dairies in Manatee County.

About 1,600 acres is used for citrus groves. Most of the old groves planted in the 1920's and 1930's have been converted to urban land. New groves are being planted throughout the county, however, and the trend is toward an increasing acreage. Most of the groves are planted on small acreages because of the cost of minimizing soil limitations.

Almost all food, grain, and hay crops require some form of irrigation to survive in Sarasota County. Because of the inherently low available water capacity of the soils, frequent, often daily, irrigation is needed. Most of the citrus groves are irrigated by a highly efficient low-volume system, such as a drip system or a mist sprayer. Each tree may be irrigated by one or two emitters, which supply enough water to meet the requirements for several days during a drought. Vegetables and other crops are irrigated by a semiclosed system, in which water is supplied to an open ditch furrow by way of a pipeline.

None of the soils in the county meet the requirements for prime farmland as defined by the U.S. Department of Agriculture. The soils are too wet because of a seasonal high water table, are too frequently flooded, or are too droughty during the growing season of most crops to meet these requirements.

Urbanization of agricultural land in Sarasota County has occurred mainly along the coastal strip. Almost all of the land east of Interstate 75 is unimproved rangeland or woodland that is either idle or is being grazed by cattle.

Of the 206,000 acres classified as rangeland or woodland in 1983, about 122,160 acres was used for beef and dairy production *(3)*. Native rangeland is used for grazing in about 83 percent of the livestock enterprises in the county. All of the commercial ranches are cow-calf enterprises. The county currently has 35 livestock enterprises that are commercial, purebred, or both. It has about 22,000 head of beef cattle and dairy cows. The total number of cattle is not expected to increase because the range is in fair or poor condition. Salt and minerals are used to supplement the native forage during the year.

A trend over the years has been for farmers to clear rangeland and to farm the land for the cost of clearing and of installing a well. After one or two growing seasons, the land is planted to improved pasture grasses and the use of the land reverts to the rancher. Because of the high cost of clearing and the expense of drilling a well, however, most farmers are returning to old pastures that were farmed at least 4 or 5 years earlier. Also, most of the larger areas of contiguous rangeland have been cleared, and the only remaining parcels are those that have numerous ponds. The conversion of rangeland to improved pasture is not likely to be common in the next few years.

Transportation Facilities

Most of the major roads in Sarasota County were fairly well established by 1927. Most of the road network is west of Interstate 75. The east-west roads were built along section lines. They linked the rural areas to the coastal population centers. Most of the major thoroughfares are not adequate for the traffic

Figure 1.—Tomatoes in an area of EauGallie and Myakka fine sands. A water-control system is needed if vegetable crops are grown on these soils.

congestion caused by rapid population growth and seasonal tourism.

The Sarasota-Bradenton Airport provides Sarasota County with airline service by five commercial carriers. The county has three other airports, two public and one private. Bus service also is available.

Recreation

Opportunities for a variety of recreational activities are available in Sarasota County. Some of the active recreational activities include freshwater and saltwater fishing, swimming, boating, waterskiing, and horseback riding. One of the first golf courses in North America was built in Sarasota in 1886. The county also has two state parks. The Myakka River State Park, which is the largest state park in Florida, makes up 28,875 acres, 18,929 acres of which is in Sarasota County. The public beaches in the county are international attractions because of the opportunities that they provide for various water sports and because of their scenic qualities.

The county provides opportunities for visitors and residents to watch tennis matches, golf, and baseball games. Venice is the winter headquarters of one of the largest circuses in the world. The Asolo State Theatre and the Ringling Museum (fig. 2) provide two of the many cultural activities available in the county.

How This Survey Was Made

This survey was made to provide information about the soils in the survey area. The information includes a description of the soils and their location and a discussion of the suitability, limitations, and management of the soils for specified uses. Soil scientists observed the steepness, length, and shape of slopes; the general pattern of drainage; the kinds of crops and native plants growing on the soils; and the kinds of bedrock. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

The soils in the survey area occur in an orderly pattern that is related to the geology, the landforms, relief, climate, and the natural vegetation of the area. Each kind of soil is associated with a particular kind of landscape or with a segment of the landscape. By observing the soils in the survey area and relating their position to specific segments of the landscape, a soil scientist develops a concept, or model, of how the soils were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of

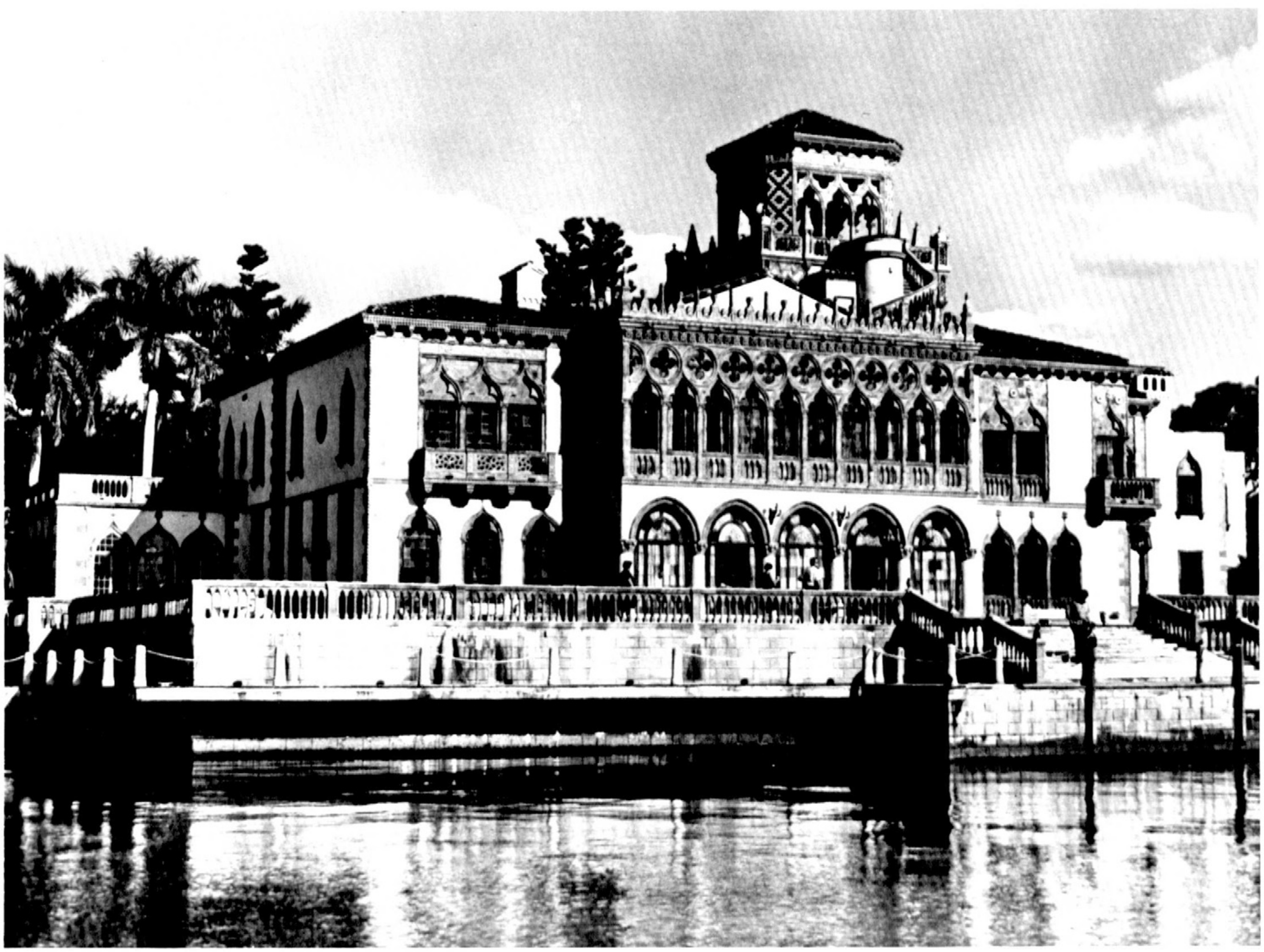


Figure 2.—The Ringling Museum, which is in an area of Matlacha gravelly sand. Photo courtesy of the Florida Division of Tourism.

soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. The system of taxonomic classification used in the United States is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile *(19)*. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot assure that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

In Sarasota County a ground penetrating radar system was used to document the type and variability of the soils occurring in the map units *(5, 6, 9, 15)*. This system was successfully used on most of the soils to detect the presence of and measure the depth to major soil horizons or other soil features and to determine the variability of those features. A total of 650 random transects were made with ground penetrating radar in the county. Information from notes and ground-truth observations made in the field was used, along with radar data from this study, to classify the soils and to determine the composition of the map units. The map units described in the section "Detailed Soil Map Units" are based on this data and on data in the previous survey.

Map Unit Composition

A map unit delineation on a soil map represents an area dominated by one major kind of soil or an area dominated by several kinds of soil. A map unit is identified and named according to the taxonomic classification of the dominant soil or soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural objects. In common with other natural objects, they have a characteristic variability in their properties. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of soils of other taxonomic classes. Consequently, every map unit is made up of the soil or soils for which it is named and some soils that belong to other taxonomic classes. These latter soils are called inclusions or included soils.

Most inclusions have properties and behavioral patterns similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting (similar) inclusions. They may or may not be mentioned in the map unit descriptions. Other inclusions, however, have properties and behavior divergent enough to affect use or require different management. These are contrasting (dissimilar) inclusions. They generally occupy small areas and cannot be shown separately on the soil maps because of the scale used in mapping. The inclusions of contrasting soils are mentioned in the map unit descriptions. A few inclusions may not have been observed and consequently are not mentioned in the descriptions, especially where the soil pattern was so complex that it was impractical to make enough observations to identify all of the kinds of soil on the landscape.

The presence of inclusions in a map unit in no way diminishes the usefulness or accuracy of the soil data. The objective of soil mapping is not to delineate pure taxonomic classes of soils but rather to separate the landscape into segments that have similar use and management requirements. The delineation of such landscape segments on the map provides sufficient information for the development of resource plans, but onsite investigation is needed to plan for intensive uses in small areas.

General Soil Map Units

The general soil map at the back of this publication shows broad areas that have a distinctive pattern of soils, relief, and drainage. Each map unit on the general soil map is a unique natural landscape. Typically, a map unit consists of one or more major soils and some minor soils. It is named for the major soils. The soils making up one unit can occur in other units but in a different pattern.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils can be identified on the map. Likewise, areas where the soils are not suitable can be identified.

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or a building or other structure. The soils in any one map unit differ from place to place in slope, depth, drainage, and other characteristics that affect management.

Soils on the Coastal Islands

These soils are nearly level to gently sloping and are moderately well drained to very poorly drained. On the gulf side of the islands, they are on low coastal dunes and sandy beaches. On parts of the bay side, they are very low and mucky.

1. Canaveral-Beaches-Kesson

Beaches and nearly level to gently sloping, moderately well drained, somewhat poorly drained, and very poorly drained, sandy soils that have shell fragments and that in very poorly drained areas have a surface layer of muck

This map unit consists mainly of soils on the coastal islands and on a narrow strip between the Gulf of Mexico and the mainland. The vegetation in the higher areas consists of Australian pine, sand live oak, cabbage palm, and a sparse cover of various grasses and sedges. Beaches are generally devoid of vegetation, although a sparse cover of seaoats, railroad vine, and other salt-tolerant plants is near the inland edges. Red, black, and white mangroves grow in areas of the tidal swamps. Searocket, saltwort, perennial glasswort, seashore saltgrass, and seashore paspalum grow in some areas.

This map unit makes up about 1 percent of the county. It includes about 4,600 acres. It is about 75 percent Canaveral soils, 14 percent Beaches, 8 percent Kesson soils, and 3 percent soils of minor extent.

Canaveral soils are on low, dunelike ridges. They are moderately well drained or somewhat poorly drained. They consist of a mixture of light colored quartz sand grains and multicolored shell fragments.

Beaches are long and narrow and are adjacent to the gulf. They consist of quartz sand and many generally small shell fragments. They are subject to continuous wave action.

Kesson soils are in the low mangroves, mainly on the bay side of the coastal islands. They are very poorly drained. They are muck to a depth of about 7 inches. The underlying material is fine sand containing shell fragments. These soils are flooded during normal high tides.

The soils of minor extent in this map unit include EauGallie soils, the depressional Pompano soils, and St. Augustine and Wulfert soils.

The soils in this unit are used for urban and recreational development.

Soils on Hammocks

These soils are nearly level and are poorly drained and very poorly drained. A dense stand of live oak and cabbage palm trees is characteristic on these soils.

2. Wabasso-EauGallie-Felda

Nearly level, poorly drained and very poorly drained soils that have a sandy and loamy subsoil or a loamy subsoil

This map unit consists of soils that are mainly on hammocks but in some areas are on flatwoods. Most of the unit is in a narrow strip on both sides of the Myakka River. The natural vegetation is longleaf pine, slash pine, cabbage palm, live oak, magnolia, saw palmetto, inkberry, waxmyrtle, bluestem, indiangrass, Florida paspalum, pineland threeawn, panicum, deer tongue, grassleaf goldaster, huckleberry, and running oak.

This map unit makes up about 2 percent of the county. It includes about 8,000 acres. It is about 30 percent Wabasso soils, 25 percent EauGallie soils, 20 percent the depressional Felda soils, and 25 percent soils of minor extent.

Wabasso soils are poorly drained. Typically, the surface layer is black fine sand about 5 inches thick. The subsurface layer is gray fine sand to a depth of about 8 inches. The subsoil extends to a depth of about 80 inches. The upper 10 inches is very dark gray fine sand that is coated with colloidal organic matter. The next 7 inches is very light gray fine sand. The lower 55 inches is dark gray sandy loam and fine sandy loam.

EauGallie soils are poorly drained. Typically, the surface layer is black fine sand about 6 inches thick. The subsurface layer is gray fine sand to a depth of about 22 inches. The subsoil extends to a depth of about 66 inches. The upper 22 inches is fine sand coated with organic matter. It is dark reddish brown grading to dark brown. The next 4 inches is light gray fine sand. The lower 18 inches is grayish brown sandy loam. The substratum to a depth of 80 inches or more is gray fine sandy loam.

The depressional Felda soils are very poorly drained. Typically, the surface layer is very dark grayish brown fine sand about 3 inches thick. The subsurface layer is gray and light brownish gray fine sand to a depth of about 22 inches. The subsoil to a depth of about 60 inches is gray sandy loam. The substratum to a depth of 80 inches or more is gray loamy sand.

The soils of minor extent in this map unit include Bradenton and Ft. Green soils and the depressional Manatee soils.

The soils in this unit are used mainly for wildlife habitat, recreational development, and improved pasture.

Soils on Flatwoods

These soils are nearly level and are moderately well drained, poorly drained, or very poorly drained. This is the largest group of soils in the county. It is in all parts of the county, except for barrier islands, flood plains, and mangrove swamps. In most areas the soils are sandy and have a dark subsoil overlying a gray, loamy subsoil. In some areas they are sandy throughout and have a dark subsoil. In other areas they have a gray, loamy subsoil.

3. EauGallie-Myakka-Holopaw-Pineda

Nearly level, poorly drained and very poorly drained soils that have a sandy surface layer and a sandy and loamy subsoil, are sandy throughout, or have a sandy surface layer and a loamy subsoil

This map unit consists of soils on broad flatwoods interspersed with sloughs surrounding many depressions that are seasonally ponded. It is the dominant unit in the county, occurring in all areas, except for those very near the coast.

The natural vegetation consists of South Florida slash pine and scattered cabbage palm. The understory includes inkberry, saw palmetto, chalky bluestem, creeping bluestem, pineland threeawn, waxmyrtle, panicum, and other grasses. Baldcypress, pondcypress, cabbage palm, waxmyrtle, sand cordgrass, St. Johnswort, and blue maidencane grow on the very poorly drained soils.

This map unit makes up about 83 percent of the county. It includes about 305,905 acres. It is about 30 percent EauGallie soils, 23 percent Myakka soils, 15 percent the depressional Holopaw soils, 14 percent Pineda soils, and 18 percent soils of minor extent.

EauGallie soils are poorly drained. Typically, the surface layer is black fine sand about 6 inches thick. The subsurface layer is gray fine sand to a depth of about 22 inches. The subsoil extends to a depth of about 66 inches. The upper 22 inches is fine sand coated with organic matter. It is dark reddish brown grading to dark brown. The next 4 inches is light gray fine sand. The lower 18 inches is grayish brown sandy loam. The substratum to a depth of 80 inches or more is gray fine sandy loam.

Myakka soils are poorly drained. Typically, the surface layer is dark grayish brown fine sand about 6 inches thick. The subsurface layer is light gray fine sand about 18 inches thick. The subsoil is fine sand to a depth of about 60 inches. The upper 11 inches is very dark grayish brown, the next 7 inches is very dark gray, and the lower 18 inches is light yellowish brown. The substratum to a depth of 80 inches or more is pale brown fine sand.

The depressional Holopaw soils are very poorly drained. Typically, the surface layer is dark gray fine sand about 4 inches thick. The subsurface layer is light gray and grayish brown fine sand to a depth of about 50 inches. The subsoil to a depth of about 66 inches is brown sandy loam that has pockets of brown fine sand. The substratum to a depth of 80 inches or more is olive gray loamy fine sand that has pockets of brown fine sand.

Pineda soils are poorly drained. Typically, the surface layer is dark gray fine sand about 8 inches thick. The subsurface layer is gray fine sand about 14 inches thick. The upper part of the subsoil is dark yellowish brown and pale brown fine sand about 14 inches thick. The lower part to a depth of about 48 inches is light brownish gray fine sandy loam that has dark yellowish brown mottles. The substratum to a depth of 80 inches or more is grayish brown and dark grayish brown fine sand.

The soils of minor extent in this map unit include Boca, Bradenton, Delray, Felda, Hallandale, Malabar, Pople, and Smyrna soils.

The soils in this map unit are well suited to improved pasture. In most areas they are used as improved pasture. In some areas they are used as range that is cut over and undeveloped. In places they are used for tomatoes and other truck crops.

4. Pomello-Myakka-EauGallie

Nearly level, moderately well drained and poorly drained, sandy soils that in some areas are sandy in the upper part of the subsoil and loamy in the lower part

This map unit consists of soils on flatwoods that are interspersed with low ridges. The major area of the unit occurs as a 1- to 2-mile strip extending from Sarasota to Englewood and paralleling the coast. Small areas are around Old Myakka and Deer Prairie Creek.

The natural vegetation on the ridges consists of south Florida slash pine, scrub live oak, saw palmetto, fetterbush, rusty lyonia, running oak, indiangrass, pineland threeawn, grassleaf goldaster, flag pawpaw, mosses, lichens, panicums, bluestems, and various other grasses. Sand pine grows on some of the better drained soils. The natural vegetation on the lower flatwoods consists of South Florida slash pine and scattered cabbage palm. The understory includes inkberry, saw palmetto, chalky bluestem, creeping bluestem, pineland threeawn, and various other grasses.

This map unit makes up about 7 percent of the county. It includes about 23,205 acres. It is about 30 percent Pomello and the similar Cassia soils, 25 percent Myakka soils, 20 percent EauGallie soils, and 25 percent soils of minor extent.

Pomello soils are moderately well drained. Typically, the surface layer is dark gray fine sand about 4 inches thick. The subsurface layer extends to a depth of about 48 inches. It is light gray fine sand. The subsoil to a depth of 80 inches or more is dark reddish brown fine sand.

Myakka soils are poorly drained. Typically, the surface layer is dark grayish brown fine sand about 6 inches thick. The subsurface layer is light gray fine sand about 18 inches thick. The subsoil is fine sand to a depth of about 60 inches. The upper 11 inches is very dark grayish brown, the next 7 inches is very dark gray, and the lower 18 inches is light yellowish brown. The substratum to a depth of 80 inches or more is pale brown fine sand.

EauGallie soils are poorly drained. Typically, the surface layer is black fine sand about 6 inches thick. The subsurface layer is gray fine sand to a depth of about 22 inches. The subsoil extends to a depth of about 66 inches. The upper 22 inches is fine sand coated with organic matter. It is dark reddish brown grading to dark brown. The next 4 inches is light gray fine sand. The lower 18 inches is grayish brown sandy loam. The substratum to a depth of 80 inches or more is gray fine sandy loam.

The soils of minor extent in this map unit are the Delray, Holopaw, Orsino, St. Augustine, and Tavares soils. Delray and Holopaw soils are in depressions and sloughs. Orsino and Tavares soils are on ridges. St. Augustine soils are in areas that have been dredged and filled.

Most of the urban development in Sarasota County has taken place in areas of this map unit because of the better drainage of some of the soils. Other uses include pasture, range, and truck crops.

Soils in Depressions

These soils are very poorly drained and are in large, low areas throughout the eastern part of the county. The soils are sandy and have a loamy subsoil. Ponding is common in most areas.

5. Floridana

Nearly level, very poorly drained, sandy soils that have a loamy subsoil

This map unit consists mainly of very poorly drained soils that are nearly level or depressional. The soils are in two small areas east of Fruitville. The natural vegetation consists of sand cordgrass, maidencane, St. Johnswort, scattered waxmyrtle, Carolina willow, pickerelweed, cutgrass, primrose willow, sawgrass, and other water-tolerant grasses. A few cypress, bay, and maple trees grow in some areas.

This map unit makes up less than 1 percent of the county. It includes about 3,200 acres. It is about 85 percent Floridana soils and 15 percent soils of minor extent.

Typically, the surface layer of the Floridana soils is black mucky fine sand about 14 inches thick. The subsurface layer is light gray and light brownish gray sand to a depth of about 22 inches. The subsoil extends to a depth of about 60 inches. It is gray sandy loam. The substratum to a depth of 80 inches or more is gray loamy sand.

The soils of minor extent in this map unit are the

Delray, Felda, Gator, Manatee, and Holopaw soils. These soils are in landscape positions similar to those of the Floridana soils. Gator soils formed in organic material. They are more extensive than the other minor soils.

In places the soils support natural vegetation. In some areas they are subject to ponding. In many areas, however, a water-control system has been installed. The areas that have been drained generally are used for truck farming, but some are used for improved pasture.

6. Felda-Holopaw-Delray

Nearly level, very poorly drained, sandy soils that have a loamy subsoil

This map unit consists mainly of very poorly drained soils that are nearly level or depressional. The soils are in small areas, generally in the northeastern part of the county. Most areas are narrow and winding or irregularly shaped. The natural vegetation consists of blue maidencane, broomsedge, St. Johnswort, waxmyrtle, panicums, sand cordgrass, white bracted sedge, pipewort, stiff paspalum, cutgrass, and various other water-tolerant weeds and grasses. Cypress, bay, and maple grow in some areas.

This map unit makes up about 4 percent of the county. It includes about 13,000 acres. It is about 30 percent the depressional Felda soils, 30 percent the depressional Holopaw soils, 10 percent the depressional Delray soils, and 30 percent soils of minor extent.

Typically, the surface layer of the Felda soils is very dark gray fine sand about 4 inches thick. The subsurface layer is dark grayish brown fine sand to a depth of about 24 inches. The subsoil is sandy clay loam to a depth of about 65 inches. The upper 24 inches is dark grayish brown, and the lower 17 inches is grayish brown. The substratum to a depth of about 80 inches is light gray loamy sand.

Typically, the surface layer of the Holopaw soils is dark gray fine sand about 4 inches thick. The subsurface layer is light gray and grayish brown fine sand to a depth of about 50 inches. The subsoil to a depth of about 66 inches is brown sandy loam that has pockets of brown fine sand. The substratum to a depth of 80 inches or more is olive gray loamy fine sand that has pockets of brown fine sand.

Typically, the surface layer of the Delray soils is black fine sand about 30 inches thick. The subsurface layer is light brownish gray fine sand to a depth of about 54 inches. The subsoil to a depth of 80 inches or more is olive gray fine sandy loam.

The soils of minor extent in this map unit are the EauGallie, Floridana, Ft. Green, Gator, Manatee, Myakka, and Pineda soils. EauGallie, Ft. Green, Myakka, and Pineda soils are at the slightly higher elevations and are not subject to ponding.

Most areas of this map unit support natural vegetation and provide excellent habitat for wading birds and other wetland wildlife. A few areas have been drained and are used for truck crops or pasture.

Soils on Flood Plains

These soils are poorly drained or very poorly drained. They are subject to flooding. Some are sandy in the upper part and have a loamy subsoil, and others are sandy throughout. Some are organic and have a high content of sulfur, and others are sandy and have a high content of sulfur.

7. Delray-Felda-Pompano

Nearly level, very poorly drained and poorly drained, sandy soils that in most areas have a loamy subsoil but in some areas are sandy throughout

This map unit consists of nearly level soils adjacent to the Myakka River. The soils are frequently flooded. Areas are long and narrow. The natural vegetation consists mostly of cabbage palm, cypress, gum, oaks, maple, and scattered pine. In a few places it includes water-tolerant grasses.

This map unit makes up about 2 percent of the county. It includes about 7,000 acres. It is about 30 percent Delray and the similar Astor and Floridana soils, 25 percent Felda and the similar Bradenton soils, 11 percent Pompano soils, and 34 percent soils of minor extent.

Delray soils are very poorly drained. Typically, the surface layer is black fine sand about 30 inches thick. The subsurface layer is dark gray fine sand to a depth of about 54 inches. The subsoil to a depth of 80 inches or more is gray sandy loam.

Felda soils are poorly drained. Typically, the surface layer is very dark gray fine sand about 4 inches thick. The subsurface layer is dark grayish brown fine sand to a depth of about 24 inches. The subsoil is sandy clay loam to a depth of about 65 inches. The upper 24 inches is dark grayish brown, and the lower 17 inches is grayish brown. The substratum to a depth of about 80 inches is light gray loamy sand.

Pompano soils are poorly drained. Typically, the surface layer is black fine sand about 3 inches thick. The underlying material to a depth of about 80 inches is gray, light brownish gray, and grayish brown fine sand.

The soils of minor extent in this map unit are similar to the major soils or are various soils adjacent to the flood plains, the most significant of which are the Wabasso soils.

Almost all areas of this map unit support natural vegetation and are used for wildlife habitat.

8. Kesson-Wulfert

Nearly level, very poorly drained, sandy and organic soils in mangrove swamps

This map unit consists of very poorly drained soils in mangrove swamps at the mouth of the Myakka River and around Roberts Bay. The native vegetation consists mainly of black mangrove, but it includes red and white mangroves. In some areas it consists of seashore saltgrass, searocket, saltwort, perennial glasswort, and seashore paspalum.

This map unit makes up less than 1 percent of the county. It includes about 1,900 acres. It is about 50 percent Kesson soils, 40 percent Wulfert soils, and 10 percent soils of minor extent.

Typically, the surface layer of the Kesson soils is dark reddish brown muck about 7 inches thick. The underlying material to a depth of 80 inches or more is gray, grayish brown, and dark greenish gray fine sand. Shell fragments are common in the underlying material. The soils have a high content of sulfur and may become very acid after drying.

Typically, the surface layer of the Wulfert soils is black muck about 38 inches thick. The underlying material to a depth of 80 inches or more is dark gray and grayish brown fine sand. The soils have a high content of sulfur and may become very acid after drying.

The minor soils in this map unit are various mineral and organic soils that have a lower content of sulfur than the major soils and Delray, EauGallie, Ft. Green, and Pineda soils in some small areas. Also of minor extent are shallow bodies of water.

Almost all areas of this map unit support natural vegetation. These areas are very important to many species of fish and wildlife as spawning grounds, rookeries, and feeding grounds.

Detailed Soil Map Units

The map units on the detailed soil maps at the back of this survey represent the soils in the survey area. The map unit descriptions in this section, along with the soil maps, can be used to determine the suitability and potential of a soil for specific uses. They also can be used to plan the management needed for those uses. More information on each map unit, or soil, is given under "Use and Management of the Soils."

Each map unit on the detailed soil maps represents an area on the landscape and consists of one or more soils for which the unit is named.

A symbol identifying the soil precedes the map unit name in the soil descriptions. Each description includes general facts about the soil and gives the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer or of the substratum, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer or of the substratum. They also can differ in slope, stoniness, salinity, wetness, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Felda fine sand is a phase of the Felda series.

Some map units are made up of two or more major soils. These map units are called undifferentiated groups. An *undifferentiated group* is made up of two or more soils that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils in a mapped area are not uniform. An area can be made up of only one of the major soils, or it can be made up of all of them. The map unit Boca and Hallandale soils is an undifferentiated group in this survey area.

Most map units include small scattered areas of soils other than those for which the map unit is named. Some of these included soils have properties that differ substantially from those of the major soil or soils. Such differences could significantly affect use and management of the soils in the map unit. The included soils are identified in each map unit description. Some small areas of strongly contrasting soils are identified by a special symbol on the soil maps.

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. The map unit Beaches is an example. Miscellaneous areas are normally shown on the soil maps. Some that are too small to be shown are identified by a special symbol on the soil maps. Urban land is a miscellaneous area that is not shown on the maps of Sarasota County.

Table 2 gives the acreage and proportionate extent of each map unit. Other tables (see "Summary of Tables") give properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils.

2—Beaches. This map unit occurs as nearly level to sloping, narrow strips of tide- and surf-washed sandy material and shell fragments along the Gulf of Mexico shoreline. The unit commonly is a mixture of moderately alkaline sand and fine shell fragments.

Beaches range from less than 100 to about 300 feet in width. About half of the beach area may be flooded daily during high tides, and all of the beaches can be flooded by storm tides. Most have a uniform, gentle slope to the edge of the water, although the shape and slope can change with every storm.

Beaches generally support no vegetation, although a sparse cover of seaoats, railroad vine, or other salt-tolerant plants is near the inland edges.

Depth to the water table varies greatly, commonly ranging from 0 to 6 feet, depending on the distance from the shore, elevation, and tidal condition.

Beaches can be used only as recreational areas and as habitat for wildlife. Severe erosion is often a problem during severe storms. Because the beaches have great esthetic value, they are an important part of the coastline.

This map unit is in capability subclass VIIIw.

3—Boca and Hallandale soils. These nearly level, poorly drained soils are on broad flatwoods and in low areas within the flatwoods. Individual areas range from about 5 to 60 acres. Slopes are smooth or slightly concave and range from 0 to 2 percent.

The components of this map unit do not occur in a regular and repeating pattern. Some areas are entirely Boca and similar soils, some are entirely Hallandale and similar soils, and some are made up of Boca, Hallandale, and other soils. The Boca and similar soils make up about 45 percent of the map unit, and the Hallandale and similar soils make up about 35 percent.

Typically, the surface layer of the Boca soil is black fine sand about 4 inches thick. The subsurface layer is light gray and light yellowish brown fine sand about 18 inches thick. The subsoil is brownish yellow fine sandy loam to a depth of about 25 inches. The substratum is very pale brown, calcareous loamy fine sand about 7 inches thick. Hard, fractured limestone is at a depth of about 32 inches.

Typically, the surface layer of the Hallandale soil is dark gray sand about 4 inches thick. The underlying material extends to a depth of about 14 inches. The upper 6 inches is brown sand, and the lower 8 inches is light gray fine sand. Below this is hard, fractured limestone bedrock.

Included with these soils in mapping are small areas of Felda, Pineda, and Pompano soils. Also included are small areas of exposed limestone bedrock. Included areas make up less than 20 percent of the map unit.

The Boca and Hallandale soils have a seasonal high water table at a depth of 6 to 18 inches for 2 to 4 months or more. The water table recedes below the limestone for about 6 months during dry periods. Permeability is rapid in the surface layer, subsurface layer, and substratum of the Boca soil and moderate in the subsoil. It is rapid in the surface layer of the Hallandale soil and moderate to rapid in the underlying material. The available water capacity is very low in both soils. Natural fertility and the organic matter content are low.

Most areas of these soils support natural vegetation of South Florida slash pine and scattered cabbage palm and laurel oak. The understory is saw palmetto, waxmyrtle, pineland threeawn, chalky bluestem, maidencane, and various weeds and grasses.

Under natural conditions, these soils are not suited to cultivated crops because of the wetness and the shallowness to limestone. The number of suitable crops is limited unless good water-control and soil-improving measures are applied. A water-control system that removes excess water during wet periods and provides water through subsurface irrigation during dry periods is needed. Because of rock near the surface of the Hallandale soil, however, construction of such a system is difficult. Soil-improving crops and crop residue management help to control erosion and maintain the content of organic matter. Seedbed preparation should include bedding of rows. Fertilizer should be applied according to the needs of the crop.

Under natural conditions, these soils are poorly suited to citrus trees because of the wetness and the shallowness to limestone. In areas that usually are not subject to freezing temperatures, however, the suitability is fair if a water-control system maintains the water table below a depth of about 4 feet and if intensive management is applied. Planting the trees on beds results in good surface drainage. A good close-growing cover crop between the tree rows helps to control soil blowing. Regular applications of fertilizer are needed.

The suitability of these soils for improved pasture and hay crops is good. Pangolagrass, improved bahiagrass, and white clover grow well in properly managed areas. Management should include a water-control system to remove excess surface water after heavy rains, regular applications of fertilizer and lime, and controlled grazing.

The potential productivity of these soils for pine trees is moderate. The equipment limitation, seedling mortality, the windthrow hazard, and plant competition are the main management concerns. South Florida slash pine and slash pine are suitable for planting.

These soils are moderately suited to the production of desirable range plants. The dominant forage is creeping bluestem, lopsided indiangrass, pineland threeawn, South Florida bluestem, and chalky bluestem. Management should include deferred grazing and brush control. The soils are in the South Florida Flatwoods range site.

These soils are severely limited as sites for buildings, sanitary facilities, and recreational uses. Water-control measures are needed. Fill material is needed to overcome the shallowness to bedrock in the Hallandale soil. Sealing or lining sewage lagoons and sanitary landfills with impervious soil material helps to prevent seepage. Mounding may be needed on sites for septic tank absorption fields. The sandy surface layer should be stabilized on sites for recreational uses. Because of the shallowness to bedrock in the Hallandale soil, excavation is difficult and special equipment may be needed.

The Boca soil is in capability subclass IIIw, and the Hallandale soil is in capability subclass IVw.

4—Bradenton fine sand. This nearly level, poorly drained soil is on low ridges and hammocks adjacent to flood plains, sloughs, and depressions. Individual areas are irregularly shaped or elongated and range from 5 to 150 acres in size. Slopes are smooth and range from 0 to 2 percent.

Typically, the surface layer is very dark gray fine sand about 5 inches thick. The subsurface layer is light gray fine sand about 13 inches thick. The subsoil to a depth of about 62 inches is gray sandy loam. The substratum to a depth of 80 inches or more is gray loamy sand.

Included with this soil in mapping are small areas of Felda, Floridana, and Ft. Green soils. These soils make up about 15 percent of the map unit.

The Bradenton soil has a seasonal high water table within 12 inches of the surface for 2 to 4 months and at a depth of 12 to 40 inches for more than 6 months. In dry periods the water table recedes to a depth of more than 40 inches. Many areas of this soil have been artificially drained. Permeability is rapid in the surface layer and subsurface layer, moderate in the subsoil, and moderate or moderately rapid in the substratum. The available water capacity is moderate. Natural fertility is low, and the organic matter content is moderate or high.

Most areas of this soil support natural vegetation. A few areas are used for improved pasture or for urban development. The natural vegetation is slash pine, South Florida slash pine, longleaf pine, laurel oak, live oak, cabbage palm, and magnolia. The understory includes scattered saw palmetto, waxmyrtle, wild coffee, bluestem, longleaf uniola, and panicum.

Under natural conditions, this soil is poorly suited to cultivated crops because of the wetness. The suitability for vegetable crops is fair, however, if a water-control system removes excess water rapidly during wet periods and provides water through subsurface irrigation during dry periods. Soil-improving crops and crop residue management help to control erosion and maintain the content of organic matter. Seedbed preparation should include bedding of rows. Fertilizer and lime should be applied according to the needs of the crop.

In areas that usually are not subject to freezing temperatures, the suitability of this soil for citrus trees is good if a water-control system maintains the water table below a depth of about 4 feet. Planting the trees on beds results in good surface drainage. A good close-growing cover crop between the tree rows helps to control soil blowing. Regular applications of fertilizer are needed.

The suitability of this soil for improved pasture and hay crops is good. Pangolagrass, improved bahiagrass, and white clover grow well in properly managed areas. Management should include a water-control system to remove excess surface water after heavy rains, regular applications of fertilizer and lime, and controlled grazing.

The potential productivity of this soil for pine trees is moderately high. The equipment limitation and seedling mortality are management concerns. Water-control measures are necessary. Bedding of rows helps to control wetness. South Florida slash pine and slash pine are suitable for planting.

This soil is poorly suited to the production of desirable range plants. The vegetative community is cabbage palm, laurel oak, live oak, scattered saw palmetto, wild coffee, and various grasses. Because of the dense canopy of palm trees, this range site is a preferred shading and resting area for cattle. As a result, the site usually is overgrazed. Management should include deferred grazing, brush control, and proper stocking rates. The soil is in the Cabbage Palm Flatwoods range site.

This soil is severely limited as a site for buildings, sanitary facilities, and recreational uses. Water-control measures are needed. Sealing or lining sewage lagoons and trench sanitary landfills with impervious soil material helps to prevent seepage. Mounding sites for septic tank absorption fields helps to control wetness. The sides of shallow excavations should be shored.

The capability subclass is IIIw.

5—Bradenton fine sand, frequently flooded. This nearly level, poorly drained soil is along streams and rivers and on low ridges and hammocks on flood plains. It is flooded for brief periods following heavy, prolonged rains. Individual areas are long and narrow and range from 5 to 20 acres in size. Slopes are smooth or concave and range from 0 to 2 percent.

Typically, the surface layer is very dark gray fine sand about 5 inches thick. The subsurface layer is light gray fine sand about 13 inches thick. The subsoil to a depth of about 62 inches is gray sandy loam. The substratum to a depth of 80 inches or more is gray loamy sand.

Included with this soil in mapping are small areas of Astor, Felda, and Pineda soils. These soils make up about 15 percent of the map unit.

The Bradenton soil has a seasonal high water table within 12 inches of the surface for 2 to 6 months. This soil usually is flooded every year and more than once in most years. The duration and extent of flooding vary, depending on the intensity and frequency of rainfall. Permeability is rapid in the surface layer and subsurface layer, moderate in the subsoil, and moderate or moderately rapid in the substratum. The available water capacity is moderate. Natural fertility is medium, and the organic matter content is moderate or high.

Most areas are used as native range or as woodland. The natural vegetation is slash pine, South Florida slash pine, longleaf pine, laurel oak, live oak, cabbage palm, scattered saw palmetto, and sweetgum. The understory includes waxmyrtle, pineland threeawn, maidencane, longleaf uniola, switchgrass, panicum, and other water-tolerant grasses.

Under natural conditions, this soil is not suited to cultivated crops, citrus trees, or improved pasture. The suitability for some vegetable crops and improved pasture is fair, however, if an extensive water-control system reduces the hazard of flooding, removes excess water rapidly, and provides water through subsurface irrigation during dry periods. Soil-improving crops and crop residue management help to control erosion and maintain the content of organic matter. Seedbed preparation should include bedding of rows. Fertilizer should be applied according to the needs of the crop. Improved bahiagrass grows well in properly managed areas. Management should include controlled grazing and applications of fertilizer and lime.

The potential productivity of this soil for pine trees is high. Water-control measures are necessary to remove excess surface water and reduce the hazard of flooding. Bedding of rows helps to overcome the wetness. The equipment limitation and seedling mortality are the main management concerns. South Florida slash pine and slash pine are suitable for planting.

This soil is poorly suited to the production of desirable range plants. The vegetative community is cabbage palm, laurel oak, live oak, sweetgum, and various grasses. Because of the dense canopy of palm trees and other trees, this range site is a preferred shading and resting area for cattle (fig. 3). As a result, the site usually is overgrazed. Management should include deferred grazing, brush control, proper stocking rates, and erosion control in areas along sloping streambanks where cattle might enter the stream. The soil is in the Wetland Hardwood Hammock range site.

This soil is severely limited as a site for buildings, sanitary facilities, and recreational uses because of the flooding and the wetness. Major flood-control structures and extensive local drainage systems are needed to protect the soil against flooding. Limitations are severe on sites for septic tank absorption fields. Installing water-control measures, adding fill material, and mounding the absorption field help to overcome wetness. The proximity to a stream or aquifer recharge area should be considered when a site is selected for sanitary facilities because the effluent from these facilities can contaminate water supplies. Fill material is needed on sites for local roads and streets, small commercial buildings, and playgrounds.

This soil is well suited to habitat for wetland and woodland wildlife. Shallow water areas can be easily developed, and the vegetation provides abundant food and shelter.

The capability subclass is Vw.

6—Canaveral fine sand, 0 to 5 percent slopes. This nearly level and gently sloping, somewhat poorly drained or moderately well drained soil is on low, dunelike ridges and side slopes bordering sloughs and mangrove swamps. Individual areas range from 20 to about 300 acres in size. Slopes are smooth or convex.

Typically, the surface layer is about 7 inches thick. It is fine sand mixed with about 10 percent sand-sized shell fragments. It is dark gray grading to gray. The underlying material to a depth of 80 inches or more is light gray, light yellowish brown, pale brown, and light gray fine sand mixed with about 10 to 40 percent sand-sized, multicolored shell fragments.

Included with this soil in mapping are small areas of Pompano and St. Augustine soils. Also included are soils that are similar to the Canaveral soil but have a thicker dark surface layer, are steeper, or have a thin, discontinuous ledge of limestone at various depths. Included soils make up about 15 percent of the map unit.

Under natural conditions, the Canaveral soil has a water table at a depth of 12 to 40 inches for 2 to 6 months during most years and within a depth of 60 inches for most of the remainder of the year. Permeability is very rapid, and the available water capacity is very low. Natural fertility and the organic matter content also are very low.

The native vegetation is sand live oak, cabbage palm, scattered saw palmetto, southern magnolia, and scattered slash pine. The understory is inkberry, pineland threeawn, and various weeds and grasses. Australian pine, cabbage palm, and a sparse ground cover of various grasses and sedges are in many areas.

Under natural conditions, this soil is not suited to cultivated crops or improved pasture grasses. The very low available water capacity and the very low natural fertility severely restrict the variety of grasses that can be grown.

Under natural conditions, this soil is poorly suited to citrus trees. The suitability is fair, however, if intensive management, including irrigation and regular applications of fertilizer, is applied. A close-growing cover crop between the trees helps to control soil blowing.

This soil generally is not used as range or forest. It is

Figure 3.—An area of Bradenton fine sand, frequently flooded. The canopy of trees on this soil provides shade for livestock.

in the South Florida Coastal Strand ecological plant community.

This soil is severely limited as a site for buildings, sanitary facilities, and recreational uses. Water-control measures are needed. The sandy surface layer should be stabilized on sites for recreational uses. Applying water-control measures and sealing or lining trench sanitary landfills and sewage lagoons with impervious soil material help to prevent seepage. The sides of shallow excavations should be shored. Native plants should be selected for landscaping because of the droughtiness of the soil.

The capability subclass is VIs.

7—Cassia fine sand. This nearly level, somewhat poorly drained soil is on low ridges that are slightly higher than the adjacent flatwoods and on shoulder slopes adjacent to drainageways. Individual areas are irregularly shaped, elongated, or broad and range from 6 to 175 acres in size. Slopes are smooth or convex and range from 0 to 2 percent.

Typically, the surface layer is dark gray fine sand about 4 inches thick. The subsurface layer is white fine sand about 20 inches thick. The subsoil is dark reddish brown fine sand to a depth of 34 inches. The substratum to a depth of 80 inches or more is fine sand. The upper 9 inches is dark brown, the next 20 inches is pale brown, and the lower 15 inches or more is light gray.

Included with this soil in mapping are small areas of EauGallie, Myakka, and Pomello soils. Also included are small areas of soils that are similar to the Cassia soil but have a thin, brown subsoil that is weakly coated with colloidal organic matter, have a subsoil that is more than 20 inches thick, or are underlain by material that has shell fragments below a depth of 60 inches.

The Cassia soil has a seasonal high water table at a depth of 18 to 42 inches for about 6 months. The water table recedes to a depth of more than 42 inches during extended dry periods. Permeability is rapid in the surface layer, subsurface layer, and substratum. It is moderate or moderately rapid in the subsoil. The available water capacity is low.

Most areas of this soil support natural vegetation of slash pine, South Florida slash pine, sand live oak, sand pine, and a few longleaf pines. The understory includes saw palmetto, running oak, creeping bluestem, broomsedge bluestem, lopsided indiangrass, pineland threeawn, cinnamon fern, panicum, and various other grasses.

Under natural conditions, this soil is poorly suited to cultivated crops and to citrus trees because of the periodic wetness and the low available water capacity. The suitability for some vegetable crops is fair, however, if adequate water-control and soil-improving measures are applied. The water-control system should remove excess water during wet periods and provide water through subsurface irrigation during dry periods. Soil-improving crops and crop residue management help to control erosion and maintain the content of organic matter. Fertilizer and lime should be applied according to the needs of the crop.

In areas that usually are not subject to freezing temperatures, the suitability for citrus trees is fair if good management is applied. The water-control system should maintain the water table below a depth of about 4 feet during wet periods and provide water through subsurface irrigation during periods of low rainfall. Regular applications of fertilizer and lime are needed. A suitable cover crop between the tree rows helps to control soil blowing.

The suitability of this soil for improved pasture grasses is fair. Bahiagrass and pangolagrass are the best suited species. Regular applications of fertilizer and lime are needed. Overgrazing should be prevented.

The potential productivity of this soil for pine trees is moderate. Seedling mortality is the main management concern. Longleaf pine, slash pine, and South Florida slash pine are suitable for planting.

This soil is poorly suited to the production of desirable range plants. The vegetative community is a dense understory of saw palmetto, running oak, and cinnamon fern. Although seldom grazed by livestock, this site provides protection for the livestock in winter. The soil is in the Sand Pine Scrub range site.

This soil is severely limited as a site for dwellings with basements and for recreational uses. It is moderately limited as a site for dwellings without basements, for small commercial buildings, and for local roads and streets. Water-control measures are needed. An increase in the size of septic tank absorption fields may be needed because of the wetness. The rapid permeability can cause pollution of ground water in areas of septic tank absorption fields. Community sewage systems help to prevent this pollution in areas of moderate or high housing density. The proximity to a stream or aquifer recharge area should be considered when a site for sanitary facilities is selected. Applying water-control measures and sealing or lining sewage lagoons and trench sanitary landfills with impervious soil material help to prevent seepage. The sandy surface layer should be stabilized on sites for recreational uses. The sides of shallow excavations should be shored.

The capability subclass is VIs.

8—Delray fine sand, depressional. This nearly level, very poorly drained soil is in depressions on flatwoods. Individual areas are oval, irregularly shaped, or elongated and range from 5 to 200 acres in size. Slopes are concave and are less than 2 percent.

Typically, the surface layer is black fine sand about 30 inches thick. The subsurface layer is light brownish gray fine sand to a depth of about 54 inches. The subsoil to a depth of 80 inches or more is olive gray fine sandy loam.

Included with this soil in mapping are small areas of Astor, Felda, Gator, and Pompano soils. Also included are soils that are similar to the Delray soil but have a thin surface layer of muck. Included soils make up less than 20 percent of the map unit.

Under natural conditions, the Delray soil is ponded for 6 to 9 months or more each year. For much of the remainder of most years, the seasonal high water table is within a depth of 12 inches. Permeability is rapid in the surface layer and subsurface layer and moderate or moderately rapid in the subsoil. The available water capacity is moderate. Natural fertility is medium, and the organic matter content is moderate or high.

Most areas of this soil support natural vegetation of cypress, pickerelweed, maidencane, arrowhead, cutgrass, sand cordgrass, sedges, ferns, and other water-tolerant grasses. They provide excellent habitat for wading birds and other wetland wildlife.

Under natural conditions, this soil is not suited to cultivated crops because of the ponding. Establishing an adequate drainage system is difficult because most areas do not have a suitable drainage outlet. The suitability for many vegetable crops remains poor even if intensive management and soil-improving measures are applied and a water-control system removes excess water rapidly. Adequate seedbed preparation and crop rotations are needed. Seedbed preparation should include bedding of rows. Soil-improving crops and crop residue management help to control erosion and maintain the content of organic matter. Fertilizer and lime should be applied according to the needs of the crop.

Under natural conditions, this soil is not suited to citrus trees. The suitability is fair, however, if intensive management and soil-improving measures are applied and if a water-control system removes excess water rapidly and maintains the water table below a depth of about 4 feet. Planting the trees on beds lowers the effective depth of the water table. A good close-growing cover crop between the tree rows helps to control soil blowing. Regular applications of fertilizer are needed.

Under natural conditions, this soil is not suited to improved pasture grasses. The suitability is fair, however, if an adequate water-control system removes excess surface water after heavy rains. Pangolagrass, improved bahiagrass, and white clover grow well in properly managed areas. Controlled grazing and regular applications of fertilizer and lime are needed.

This soil is not suitable for the commercial production of pine trees because of the long periods of ponding.

This soil is moderately suited to the production of desirable range plants. The dominant forage is maidencane and cutgrass. Grazing is naturally deferred when the water table is close to the surface. This rest period increases forage production, but the high water levels may reduce the grazing value of the site. The soil is in the Freshwater Marshes and Ponds range site.

This soil is severely limited as a site for buildings, sanitary facilities, and recreational development. Water-control measures are needed. Sealing or lining sewage lagoons and trench type sanitary landfills with impervious soil material helps to prevent seepage. Fill material should be used on sites for septic tank absorption fields, local roads and streets, small commercial buildings, and playgrounds. The sides of shallow excavations should be shored. Mounding may be needed on sites for septic tank absorption fields.

The capability subclass is VIIw.

9—Delray and Astor soils, frequently flooded. These level and nearly level, very poorly drained soils are on the flood plain along the Myakka River and in swamps adjacent to Lake Myakka. The soils are frequently flooded after prolonged heavy rains. Individual areas are irregularly shaped or elongated and range from 10 to 100 acres in size. Slopes are smooth or concave and range from 0 to 2 percent.

The components of this map unit do not occur in a regular and repeating pattern. Some areas are entirely Delray and similar soils, some are entirely Astor and similar soils, and some are made up of Delray, Astor, and other soils. The Delray and similar soils make up about 45 percent of the map unit, and the Astor and similar soils make up about 35 percent.

Typically, the surface layer of the Delray soil is black fine sand about 30 inches thick. The subsurface layer is dark gray fine sand to a depth of about 54 inches. The subsoil to a depth of 80 inches or more is gray sandy loam.

Typically, the surface layer of the Astor soil is 32 inches thick. The upper 2 inches is black mucky fine sand. The next 20 inches is very dark gray mucky fine sand. The lower 10 inches is very dark gray fine sand. The underlying material extends to a depth of about 80 inches or more. The upper 15 inches is grayish brown loamy sand. The next 7 inches is light brownish gray loamy sand. The lower 26 inches or more is light brownish gray fine sand.

Included with these soils in mapping are small areas of Felda and Floridana soils. These included soils make up less than 20 percent of the map unit.

The Delray and Astor soils have a seasonal high water table at or above the surface during the summer rainy season. During dry periods the water table may recede to a depth of 30 inches or more. Sheet flow occurs during periods of heavy rainfall. The duration and extent of flooding vary, depending on the intensity and frequency of rainfall. Permeability is rapid in the Astor soil and moderate or moderately rapid in the subsoil of the Delray soil. The available water capacity is moderate in both soils. Natural fertility is high in both soils, and the organic matter content is very high or high.

Most areas of these soils support natural vegetation of cypress, sweetgum, water oak, laurel oak, red maple, cabbage palm, and pine. The understory is scattered saw palmetto, waxmyrtle, greenbrier, poison ivy, maidencane, chalky bluestem, sedges, and other water-tolerant grasses.

Under natural conditions, these soils are unsuited to cultivated crops and citrus trees because of the frequent flooding and very poor drainage. The suitability for many vegetable crops is fair, however, if intensive management and soil-improving measures are applied and if a water-control system removes excess water rapidly. Adequate seedbed preparation and crop rotations are needed. Seedbed preparation should include bedding of rows. Cover crops and crop residue management help to control erosion and maintain the content of organic matter. Fertilizer and lime should be applied according to the needs of the crop.

Under natural conditions, these soils are poorly suited to improved pasture. The suitability is good, however, if an adequate water-control system removes excess surface water after periods of heavy rainfall. Pangolagrass and improved bahiagrass grow well in properly managed areas. Regular applications of fertilizer and lime are needed. Controlled grazing helps to maintain plant vigor.

The potential productivity of these soils for pine trees is high. Water-control measures are necessary to remove excess surface water and reduce the hazard of flooding. The equipment limitation and seedling mortality are the main management concerns. South Florida slash pine and slash pine are suitable for planting.

These soils generally are not used as rangeland. They are in the Swamp Hardwoods ecological plant community.

These soils are severely limited as sites for buildings, sanitary facilities, and recreational uses because of the flooding and the wetness. Major flood-control structures and extensive local drainage systems are needed. Limitations are severe on sites for septic tank absorption fields. Installing water-control measures, adding fill material, and mounding help to overcome wetness on sites for septic tank absorption fields. The proximity to a stream or aquifer recharge area should be considered when a site for sanitary facilities is selected because the effluent from these facilities can contaminate water supplies. Fill material is needed on sites for local roads and streets, small commercial buildings, and playgrounds.

These soils are well suited to habitat for wetland and woodland wildlife. Shallow water areas can be easily developed, and the vegetation provides abundant food and shelter.

These soils are in capability subclass VIw.

10—EauGallie and Myakka fine sands. These nearly level, poorly drained soils are on broad flatwoods. Individual areas are long and broad or are irregular in shape and range from 20 to more than 700 acres in size. Slopes are smooth and range from 0 to 2 percent.

The components of this map unit do not occur in a regular and repeating pattern. Some areas are entirely EauGallie and similar soils, some are entirely Myakka and similar soils, and some are made up of EauGallie, Myakka, and other soils. The EauGallie and similar soils make up about 45 percent of the map unit, and the Myakka and similar soils make up about 40 percent.

Typically, the surface layer of the EauGallie soil is black fine sand. The subsurface layer is gray fine sand to a depth of about 22 inches. The subsoil extends to a depth of about 66 inches. The upper 22 inches is fine sand coated with organic matter. It is dark reddish brown grading to dark brown. The next 4 inches is light gray fine sand. The lower 18 inches is grayish brown sandy loam. The substratum to a depth of about 80 inches or more is gray fine sandy loam.

Typically, the surface layer of the Myakka soil is dark grayish brown fine sand about 6 inches thick. The subsurface layer is light gray fine sand about 18 inches thick. The subsoil to a depth of 60 inches is fine sand. The upper 11 inches is very dark grayish brown, the next 7 inches is very dark gray, and the lower 18 inches is light yellowish brown. The substratum to a depth of 80 inches or more is pale brown fine sand.

Included with these soils in mapping are areas of Ona, Smyrna, and Wabasso soils. Also included are small areas of soils that are similar to the EauGallie and Myakka soils but have a subsoil that is low in content of organic matter and is less than 12 inches thick. Included soils make up 10 to 15 percent of the map unit.

Under natural conditions, the EauGallie and Myakka soils have a seasonal high water table at a depth of 6 to 18 inches for 1 to 3 months and within a depth of 40 inches for 2 to 6 months. The water table recedes to a depth of more than 40 inches during extended dry periods. The available water capacity is low in both soils. Natural fertility also is low. Permeability is rapid in the sandy surface layer, subsurface layer, and substratum. It is moderate or moderately rapid in the sandy subsoil of both soils and slow or moderately slow in the loamy part of the EauGallie soil.

Most areas of these soils support natural vegetation (fig. 4). Some areas have been cleared and planted to citrus trees. The natural vegetation is slash pine, South Florida slash pine, longleaf pine, and scattered cabbage palm and oak. The understory includes inkberry, saw palmetto, chalky bluestem, creeping bluestem, pineland threeawn, and various other grasses.

If a water-control system maintains the water table below a depth of about 4 feet, the suitability of these soils for citrus trees is good in areas that usually are not subject to freezing temperatures. Planting the trees on beds lowers the effective depth of the water table. A close-growing cover crop between the tree rows helps to control soil blowing. Regular applications of lime and fertilizer are needed.

Under natural conditions, these soils are poorly suited to cultivated crops because of the wetness and the sandy texture in the root zone. The suitability for a number of vegetable crops is fair, however, if a water-control system removes excess water during wet periods and provides water through subsurface irrigation during dry periods. Soil-improving crops and crop residue management help to control erosion and maintain the content of organic matter. Seedbed

Figure 4.—The natural vegetation on EauGallie and Myakka fine sands.

preparation should include bedding of rows. Fertilizer and lime should be applied according to the needs of the crop.

The suitability of these soils for improved pasture and hay crops is good. Pangolagrass, improved bahiagrass, and white clover grow well in properly managed areas. Water-control measures should remove excess surface water after heavy rains. Regular applications of lime and fertilizer are needed. Overgrazing should be prevented.

The potential productivity of these soils for pine trees is moderately high. The equipment limitation, seedling mortality, and plant competition are the main management concerns. South Florida slash pine and slash pine are suitable for planting.

These soils are moderately suited to the production of desirable range plants. The dominant forage is creeping bluestem, lopsided indiangrass, pineland threeawn, and chalky bluestem. Management should include deferred grazing and brush control. The soils are in the South Florida Flatwoods range site.

These soils are severely limited as sites for sanitary facilities, buildings, and recreational uses. Water-control measures are needed. Enlarged or modified septic tank absorption fields may be needed (fig. 5). Sealing or lining sewage lagoons and trench sanitary landfills with impervious soil material helps to prevent seepage. The sandy surface layer should be stabilized on sites for recreational development. The sides of shallow excavations should be shored.

These soils are in capability subclass IVw.

11—Felda fine sand. This nearly level, poorly drained soil is in sloughs and in poorly defined drainageways. Individual areas range from 10 to 100 acres in size. Slopes are smooth or concave and range from 0 to 2 percent.

Typically, the surface layer is very dark grayish brown fine sand about 3 inches thick. The subsurface layer is gray and light brownish gray fine sand to a depth of about 22 inches. The subsoil to a depth of about 60 inches is gray sandy loam. The substratum to a depth of about 80 inches is gray loamy sand.

Included with this soil in mapping are small areas of Bradenton, Holopaw, and Myakka soils and some areas of Pompano soils that are occasionally flooded. Also included are areas of soils that are similar to the Pompano soils but have a weakly stained layer of organic matter at a depth of more than 20 inches. Included soils make up less than 20 percent of the map unit.

Under natural conditions, the Felda soil has a seasonal high water table within 12 inches of the surface for 2 to 6 months during most years. It is within 30 inches of the surface for more than 9 months during the drier periods. Some areas are subject to sheet flow during periods of heavy rainfall. Permeability is rapid in the surface layer, subsurface layer, and substratum. It

Figure 5.—A septic tank absorption field in an area of EauGallie and Myakka fine sands. Both the septic tank and the absorption lines are elevated above the ground surface so that the absorption system can function properly.

is moderate or moderately rapid in the subsoil. The available water capacity is low. Natural fertility and the organic matter content also are low.

Most areas of this soil support natural vegetation of slash pine, South Florida slash pine, longleaf pine, laurel oak, saw palmetto, cabbage palm, blue maidencane, pineland threeawn, sand cordgrass, low panicum, and various weeds and grasses.

The suitability of this soil for citrus trees is fair if a water-control system maintains the water table below a depth of about 4 feet. Planting the trees on beds results in good surface drainage. A close-growing cover crop between the tree rows helps to control soil blowing. Regular applications of lime and fertilizer are needed.

Under natural conditions, this soil is poorly suited to cultivated crops because of the wetness and the sandy texture. The number of suitable crops is limited unless intensive management is applied. If good management is applied, the suitability for cropland is fair. A water-control system is needed to remove excess water rapidly and provide water through subsurface irrigation during dry periods. Soil-improving crops and crop residue management help to control erosion and maintain the content of organic matter. Seedbed preparation should include bedding of rows. Fertilizer and lime should be applied according to the needs of the crop.

The suitability of this soil for pasture and hay crops is good. Pangolagrass, improved bahiagrass, and white clover grow well in properly managed areas. Management should include a water-control system that removes excess surface water after heavy rains, regular applications of fertilizer and lime, and controlled grazing.

The potential productivity of this soil for pine trees is moderate. The equipment limitation and seedling mortality are the main management concerns. Water-control measures are needed to remove excess surface water. South Florida slash pine and slash pine are suitable for planting.

This soil is well suited to the production of desirable range plants. The dominant forage is blue maidencane, chalky bluestem, and bluejoint panicum. Management should include deferred grazing. The soil is in the Slough range site.

This soil is severely limited as a site for buildings, sanitary facilities, and recreational uses. Water-control measures are needed. An increase in the size of septic tank absorption fields may be needed. Sealing or lining sewage lagoons and trench sanitary landfills with impervious soil material helps to prevent seepage. The sandy surface layer should be stabilized on sites for recreational uses. The sides of shallow excavations should be shored.

The capability subclass is IIIw.

12—Felda fine sand, depressional. This nearly level, very poorly drained soil is in depressions. Individual areas range from 5 to 100 acres in size. Slopes are concave and are less than 2 percent.

Typically, the surface layer is very dark grayish brown fine sand about 3 inches thick. The subsurface layer is gray and light brownish gray fine sand to a depth of about 22 inches. The subsoil to a depth of about 60 inches is gray sandy loam. The substratum to a depth of 80 inches or more is gray loamy sand.

Included with this soil in mapping are small areas of Bradenton, Floridana, and Holopaw soils. Also included are soils that are similar to the Felda soil but have a surface layer of muck or mucky fine sand less than 15 inches thick. Included soils make up less than 20 percent of the map unit.

The Felda soil is ponded for 6 to 9 months or more each year. The water table is within a depth of 12 inches for 2 to 4 months of the year and is at a depth of 12 to 40 inches during most of the remainder of the year. Permeability is rapid in the surface layer, subsurface layer, and substratum. It is moderate or moderately rapid in the subsoil. The available water capacity is low. Natural fertility and the organic matter content also are low.

The natural vegetation is baldcypress, pondcypress, cabbage palm, sand cordgrass, cutgrass, maidencane, and various other water-tolerant weeds and grasses.

This soil is poorly suited to cultivated crops because of the ponding. Most areas do not have a suitable drainage outlet. As a result, establishing an adequate drainage system is difficult. If intensive management and soil-improving measures are applied and if a water-control system removes excess water rapidly, the soil is moderately suited to vegetable crops. Crop rotations and adequate seedbed preparation, including bedding of rows, are needed. Soil-improving crops and crop residue management help to control erosion and maintain the organic matter content. Fertilizer and lime should be applied according to the needs of the crop.

Under natural conditions, this soil is not suited to citrus trees. It is poorly suited to these trees even if intensive management is applied and the water-control system is adequate.

The suitability of this soil for improved pasture is fair if very intensive management and soil-improving measures are applied and if a water-control system is installed. Pangolagrass and improved bahiagrass grow well in properly managed areas. Water-control measures are needed to remove excess surface water after heavy rains. Regular applications of fertilizer and lime are needed. Controlled grazing helps to maintain plant vigor.

This soil is not suitable for the commercial production of pine trees because of the long periods of ponding.

This soil is moderately suited to the production of desirable range plants. The dominant forage is maidencane and cutgrass. Grazing is naturally deferred when the water table is near the surface. This rest period increases forage production, but the high water levels reduce the grazing value of the site. The soil is in the Freshwater Marshes and Ponds range site.

This soil is severely limited as a site for buildings, sanitary facilities, and recreational uses. Water-control measures are needed. Sealing or lining sewage lagoons and trench sanitary landfills with impervious soil material helps to prevent excessive seepage. Fill material is needed on sites for septic tank absorption fields, local roads and streets, small commercial buildings, and playgrounds. The sides of shallow excavations should be shored. Mounding may be needed on sites for septic tank absorption fields.

The capability subclass is VIIw.

13—Felda and Pompano fine sands, frequently flooded. These nearly level, poorly drained soils are on flood plains throughout the county. They are frequently flooded following prolonged, heavy rains. Individual areas are elongated and range from 10 to more than 100 acres in size. Slopes are smooth or concave and range from 0 to 2 percent.

The components of this map unit do not occur in a regular and repeating pattern. Some areas are entirely Felda and similar soils, some are entirely Pompano and similar soils, and some are made up of Felda, Pompano, and other soils. The Felda and similar soils make up about 45 percent of the map unit, and the Pompano and similar soils make up about 35 percent.

Typically, the surface layer of the Felda soil is very dark gray fine sand about 4 inches thick. The subsurface layer is dark grayish brown fine sand to a depth of about 24 inches. The subsoil to a depth of 65 inches is sandy clay loam. The upper 24 inches is dark grayish brown, and the lower 17 inches is grayish brown. The substratum to a depth of about 80 inches is light gray loamy sand.

Typically, the surface layer of the Pompano soil is black fine sand about 3 inches thick. The underlying material to a depth of about 80 inches is gray, light brownish gray, and grayish brown fine sand.

Included with these soils in mapping are areas of Astor, Bradenton, Delray, and Holopaw soils. Also included are a few areas of soils that are similar to the Felda soil but have an organic surface layer as much as 15 inches thick. Included soils make up about 20 percent of the map unit.

The Felda and Pompano soils have a seasonal high water table within 12 inches of the surface for 2 to 6 months in most years. These soils usually are flooded every year and more than once in most years. The duration and extent of flooding vary, depending on the intensity and frequency of rainfall. Permeability is rapid or very rapid in the sandy layers and moderate or moderately rapid in the loamy layers. The available water capacity is low. Natural fertility also is low.

Most areas of these soils support natural vegetation of baldcypress, laurel oak, water oak, pond pine, slash pine, South Florida slash pine, longleaf pine, and cabbage palm. The understory vegetation is waxmyrtle, pineland threeawn, maidencane, greenbrier, poison ivy, and other water-tolerant grasses and plants.

Under natural conditions, these soils are not suited to cultivated crops, citrus, or improved pasture. The suitability for some vegetable crops and improved pasture is fair, however, if a water-control system reduces the hazard of flooding, removes excess water rapidly, and provides water through subsurface irrigation during dry periods. Soil-improving crops and crop residue management help to control erosion and maintain the content of organic matter. Seedbed preparation should include bedding of rows. Fertilizer should be applied according to the needs of the crop. Improved bahiagrass grows well in properly managed areas. Management should include controlled grazing and applications of fertilizer and lime.

The potential productivity of these soils for pine trees is moderate. South Florida slash pine and slash pine are suitable for planting. Water-control measures are needed. Bedding of rows helps to overcome wetness. The equipment limitation and seedling mortality are the main management concerns.

These soils generally are not used as rangeland. They are in the Swamp Hardwoods ecological plant community.

These soils are severely limited as sites for buildings, sanitary facilities, and recreational uses because of the flooding and the wetness. Major flood-control structures and extensive local drainage systems are needed. Limitations are severe on sites for septic tank absorption fields. Installing water-control measures, adding fill material, and mounding the absorption field can help to overcome wetness. The proximity to a stream or aquifer recharge area should be considered when a site for sanitary facilities is selected because the effluent from these facilities can contaminate water supplies. Fill material is needed on sites for local roads and streets, small commercial buildings, and playgrounds.

These soils are well suited to habitat for wetland and woodland wildlife. Shallow water areas can be easily developed, and the vegetation provides abundant food and shelter.

The Felda soil is in capability subclass Vw, and the Pompano soil is in capability subclass VIw.

14—Floridana mucky fine sand. This nearly level, very poorly drained soil is in poorly defined drainageways on broad, low flats. Individual areas are larger than 100 acres. Slopes are smooth or concave and range from 0 to 2 percent.

Typically, the surface layer is black mucky fine sand about 14 inches thick. The subsurface layer is light gray and light brownish gray sand to a depth of 22 inches. The subsoil to a depth of about 60 inches is gray sandy loam. The substratum to a depth of 80 inches or more is gray loamy sand.

Included with this soil in mapping are small areas of Delray, Felda, and Manatee soils. Also included are small areas of soils that are similar to the Floridana soil but have a thin layer of muck at the surface. Included soils make up about 15 percent of the map unit.

The Floridana soil has a water table above the surface for short periods after heavy rainfall and within 12 inches of the surface for more than 6 months during most years. The water table is at a depth of 12 to 30 inches for short dry periods. Permeability is rapid in the surface layer and subsurface layer and slow or very slow in the subsoil and substratum. The available water capacity is moderate. Natural fertility is medium, and the organic matter content is high.

Many areas of this soil are drained and used for citrus trees or cultivated crops. The natural vegetation is mainly sand cordgrass, maidencane, St. Johnswort, scattered waxmyrtle, Carolina willow, pickerelweed, cutgrass, primrose willow, sawgrass, and other water-tolerant grasses.

Under natural conditions, this soil is not suited to cultivated crops. The suitability for many vegetable crops is fair, however, if intensive management and soil-improving measures are applied and if a water-control system removes excess water rapidly. Adequate seedbed preparation and crop rotations are needed. Seedbed preparation should include bedding of rows. Soil-improving crops and crop residue management help to control erosion and maintain the content of organic matter. Fertilizer and lime should be applied according to the needs of the crop.

Under natural conditions, this soil is not suited to citrus trees. The suitability is fair, however, if intensive management and soil-improving measures are applied and if a water-control system removes excess water rapidly and maintains good drainage to a depth of about 4 feet. Planting the trees on beds lowers the effective depth of the water table. A close-growing cover crop between the tree rows helps to control soil blowing. Regular applications of fertilizer are needed.

Under natural conditions, this soil is poorly suited to improved pasture. The suitability is fair, however, if an adequate water-control system removes excess surface water after heavy rains. Pangolagrass and improved bahiagrass grow well in properly managed areas. Controlled grazing and regular applications of fertilizer and lime are needed.

The potential productivity of this soil for pine trees is moderately high. South Florida slash pine and slash pine are suitable for planting. Water-control measures are needed before trees can be planted. The equipment limitation and seedling mortality are the main management concerns.

This soil is moderately suited to the production of desirable range plants. The dominant forage is maidencane and cutgrass. Grazing is naturally deferred when the water table is near the surface. This rest period increases forage production, but the high water levels reduce the grazing value of the site. The soil is in the Freshwater Marshes and Ponds range site.

This soil is severely limited as a site for buildings, sanitary facilities, and recreational uses. Water-control measures are needed. Sealing or lining sewage lagoons and trench sanitary landfills with impervious soil material can help to prevent seepage. Fill material is needed on sites for septic tank absorption fields, local roads and streets, small commercial buildings, and playgrounds. The sides of shallow excavations should be shored. Mounding may be needed on sites for septic tank absorption fields.

The capability subclass is IIIw.

15—Floridana and Gator soils, depressional. These very poorly drained, nearly level soils are in depressions. They are subject to ponding. Individual areas are oval or irregular in shape and range from 5 to about 100 acres in size. Slopes are dominantly concave and are less than 2 percent.

The components of this map unit do not occur in a regular and repeating pattern. Some areas are entirely Floridana and similar soils, some are entirely Gator and similar soils, and some are made up of Floridana, Gator, and other soils. The Floridana and similar soils make up about 75 percent of the map unit, and the Gator and similar soils make up about 25 percent.

Typically, the surface layer of the Floridana soil is about 14 inches of black mucky fine sand and fine sand. The subsurface layer to a depth of about 22 inches is gray and light gray fine sand. The subsoil to a depth of about 52 inches is grayish brown sandy clay loam. The substratum to a depth of 80 inches or more is grayish brown sandy loam.

Typically, the surface layer of the Gator soil is very dark brown muck about 22 inches thick. The upper 4 inches of the underlying material is very dark gray loamy sand, the next 34 inches is dark gray sandy clay loam, and the lower part to a depth of 80 inches is greenish gray sand.

The Floridana and Gator soils are ponded for 6 to 9 months during most years. The water table is within 12 inches of the surface for much of the remainder of the year. Permeability is rapid in the surface layer and subsurface layer and moderately slow or very slow in the loamy subsoil and underlying material. The available water capacity is dominantly moderate to very high. Natural fertility is medium.

Most areas of these soils support natural vegetation of sand cordgrass, maidencane, St. Johnswort, scattered waxmyrtle, and other water-tolerant weeds and grasses. They provide excellent habitat for wading birds and other wetland wildlife.

Under natural conditions, these soils are not suited to cultivated crops because of the ponding. Establishing an adequate drainage system is difficult because most areas do not have a suitable drainage outlet. The suitability for many vegetable crops is poor even if intensive management and soil-improving measures are applied and if a water-control system removes excess water rapidly. Adequate seedbed preparation and crop rotations are needed. Seedbed preparation should include bedding of rows. Cover crops and crop residue management increase the content of organic matter. Fertilizer and lime should be applied according to the needs of the crop.

Under natural conditions, these soils are not suited to citrus trees. These trees grow fairly well, however, if intensive management and soil-improving measures are applied and if a good water-control system removes excess water rapidly and maintains good drainage to a depth of about 4 feet. Planting the trees on beds lowers the effective depth of the water table. A close-growing cover crop between the tree rows helps to control soil blowing. Regular applications of fertilizer are needed.

Under natural conditions, these soils are not suited to improved pasture grasses. The suitability is fair, however, if an adequate water-control system removes excess surface water after heavy rains. Pangolagrass and improved bahiagrass grow well in properly managed areas. Controlled grazing and regular applications of fertilizer and lime are needed.

These soils are not suitable for the commercial production of pine trees because of the long periods of ponding.

These soils are moderately suited to the production of desirable range plants. The dominant forage is maidencane and cutgrass. Grazing is naturally deferred when the water table is near the surface. This rest period increases forage production, but the high water levels may reduce the grazing value of the site. The soil is in the Freshwater Marshes and Ponds range site.

These soils are severely limited as sites for buildings, sanitary facilities, and recreational uses. Water-control measures are needed. Sewage lagoons and trench type sanitary landfills should be sealed or lined with impervious soil material. Fill material is needed on sites for septic tank absorption fields, local roads and streets, small commercial buildings, and playgrounds. The sides of shallow excavations should be shored. Mounding may be needed on sites for septic tank absorption fields.

These soils are in capability subclass VIIw.

16—Floridana and Gator soils, frequently flooded. These very poorly drained, nearly level soils are on flood plains. They are frequently flooded after prolonged, heavy rains. Individual areas are oblong or are narrow and elongated. They range from 5 to 60 acres in size. Slopes are smooth or concave and range from 0 to 2 percent.

The components of this map unit do not occur in a regular and repeating pattern. Some areas are entirely Floridana and similar soils, some are entirely Gator and similar soils, and some are made up of Floridana, Gator, and other soils. The Floridana and similar soils make up about 75 percent of the map unit, and the Gator and similar soils make up about 25 percent.

Typically, the surface layer of the Floridana soil is about 14 inches of very dark gray mucky fine sand and fine sand. The subsurface layer is gray and grayish brown fine sand to a depth of about 36 inches. The subsoil to a depth of about 52 inches is grayish brown fine sandy loam. The substratum to a depth of 80 inches or more is grayish brown sandy loam.

Typically, the surface layer of the Gator soil is very dark brown muck about 22 inches thick. The upper 4 inches of the underlying material is very dark gray loamy sand. The next 34 inches is dark gray sandy clay loam. The lower part to a depth of 80 inches is greenish gray sand.

The Floridana and Gator soils are frequently flooded during the rainy season in most years. The water table is within 12 inches of the surface for much of the year. Permeability is rapid in the surface layer and subsurface layer and slow or very slow in the loamy subsoil and underlying material. The available water capacity is moderate or high. Natural fertility is medium.

The natural vegetation is blackgum, red maple, sweetgum, cabbage palm, cypress, laurel and water oak, and loblollybay gordonia. The understory is smartweed, fern, sedges, and other water-tolerant grasses.

In their natural state, these soils are not suited to most agricultural uses or to the commercial production of pine trees because the flooding is a severe hazard.

These soils generally are not used as rangeland. They are in the Swamp Hardwoods ecological plant community.

These soils are not suited to most urban uses because of a severe hazard of flooding and the wetness.

The Floridana soil is in capability subclass Vw, and the Gator soil is in capability subclass VIIw.

17—Gator muck. This nearly level, very poorly drained soil is in freshwater swamps and marshes. Individual areas range from 20 to 1,500 acres in size. Slopes are smooth and are less than 1 percent.

Typically, the surface layer is very dark brown muck about 22 inches thick. The upper 4 inches of the underlying material is very dark gray loamy sand. The next 34 inches is dark gray sandy clay loam. The lower part to a depth of about 80 inches is greenish gray sand that has yellowish brown stains and splotches of sandy loam.

Included with this soil in mapping are small areas of Delray, Floridana, and Manatee soils. Also included are small areas of soils that are similar to the Gator soil but have a thin layer of fibers from woody plants in the organic part of the profile. Included soils make up less than 20 percent of the map unit.

Under natural conditions, the Gator soil has a water table above the surface for most of the year. In drained areas the water table is controlled at a depth of 12 to 36 inches or according to the needs of the crop. It is at or above the surface for short periods after heavy rainfall and during the normal periods of high seasonal rainfall. Permeability is rapid in the surface layer and slow or very slow in the underlying material. The available water capacity is high. Natural fertility and the organic matter content are very high.

Some areas are drained and used for improved pasture or for crops. The natural vegetation is a dense stand of red maple, redbay, cypress, Carolina willow, primrose willow, waxmyrtle, pickerelweed, sawgrass, cattail, buttonbush, arrowhead, ferns, maidencane, and other water-tolerant grasses. Areas of this soil provide cover for deer and are excellent habitat for wading birds and other wetland wildlife.

Under natural conditions, this soil is not suitable for cultivated crops. The suitability for many vegetable crops is good, however, if intensive management and soil-improving measures are applied and if a water-control system removes excess surface water rapidly. The water-control system should remove the excess water when crops are on the soil. Keeping the water table near the surface helps to prevent subsidence of the organic material needed for crop and forage production. Management should include seedbed preparation and crop rotations. Soil-improving crops and crop residue management can help to control erosion and maintain the organic matter content. Fertilizer and lime should be applied according to the needs of the crop.

In its natural state, this soil is not suitable for citrus trees. It is poorly suited even if intensive management, such as bedding of rows, is applied and the water-control system is adequate.

In its natural state, this soil is not suitable for improved pasture grasses. The suitability is good, however, if an adequate water-control system removes excess surface water after heavy rains. Keeping the water table near the surface helps to prevent excessive subsidence of the organic material. Pangolagrass, improved bahiagrass, and white clover grow well in properly managed areas. Regular applications of fertilizer and lime are needed. Overgrazing should be prevented.

This soil is not suitable for the commercial production of pine trees because of the long periods of ponding.

This soil generally is not used as rangeland. It is in the Swamp Hardwoods ecological plant community.

This soil is severely limited as a site for buildings, sanitary facilities, and recreational uses because of the ponding and the excess humus. Water-control measures are needed. Because of low soil strength, the organic material should be replaced with suitable material. Sealing or lining sewage lagoons and trench sanitary landfills with impervious soil material helps to control seepage. The sides of shallow excavations should be shored. Mounding may be needed on sites for septic tank absorption fields.

The capability subclass is IIIw.

21—Ft. Green fine sand. This deep, nearly level, poorly drained soil is on broad flatwoods. Individual areas range from 10 to 150 acres in size. Slopes are smooth and range from 0 to 2 percent.

Typically, the surface layer is dark gray fine sand about 3 inches thick. The subsurface layer is light brownish gray and grayish brown fine sand to a depth of about 26 inches. The subsoil extends to a depth of about 80 inches. It is gray cobbly sandy loam in the upper 12 inches, gray and light gray sandy clay loam in the next 10 inches, and light gray sandy loam in the lower 32 inches.

Included with this soil in mapping are small areas of

EauGallie, Holopaw, Malabar, and Wabasso soils. Also included are wet soils in scattered small depressions. Included soils make up less than 15 percent of the map unit.

The Ft. Green soil has a water table at a depth of 6 to 18 inches for 2 to 4 months during wet periods and within a depth of 40 inches for more than 6 months. Permeability is rapid in the surface layer and subsurface layer and slow or moderately slow in the subsoil. The available water capacity is low. Natural fertility also is low.

Most areas of this soil support natural vegetation. Areas that have been cleared are used dominantly for citrus trees. The natural vegetation is slash pine, South Florida slash pine, longleaf pine, cabbage palm, saw palmetto, inkberry, rusty lyonia, blackroot, pennyroyal, pineland threeawn, chalky bluestem, panicum, and various other weeds and grasses.

The suitability of this soil for citrus trees is good if a water-control system maintains the water table below a depth of about 4 feet. Planting the trees on beds lowers the effective depth of the water table. A suitable cover crop between the tree rows helps to control erosion. Regular applications of fertilizer and lime are needed.

This soil is very severely limited if it is used for cultivated crops because of the wetness and the sandy texture in the root zone. The suitability for many vegetable crops is fair, however, if a water-control system removes excess water and provides water through subsurface irrigation during dry periods. Soil-improving crops and crop residue management can help to control erosion and maintain the organic matter content. Seedbed preparation should include bedding of rows. Fertilizer and lime should be applied according to the needs of the crop.

The suitability of this soil for improved pasture is good. Pangolagrass, improved bahiagrass, and white clover grow well in properly managed areas. Water-control measures are needed to remove excess surface water after heavy rains. Regular applications of lime and fertilizer are needed. Overgrazing should be prevented.

The potential productivity of this soil for pine trees is moderately high. The equipment limitation, seedling mortality, and plant competition are the main management concerns. South Florida slash pine and slash pine are suitable for planting.

This soil is moderately suited to the production of desirable range plants. The dominant forage is creeping bluestem, lopsided indiangrass, pineland threeawn, and chalky bluestem. Management should include deferred grazing and brush control. The soil is in the South Florida Flatwoods range site.

This soil is severely limited as a site for buildings, sanitary facilities, and recreational uses. Water-control measures are needed. An increase in the size of septic tank absorption fields may be needed because of the slow permeability. Sealing or lining sewage lagoons with impervious soil material helps to control seepage. The sandy surface layer should be stabilized on sites for recreational uses. The sides of shallow excavations should be shored.

The capability subclass is IIIw.

22—Holopaw fine sand, depressional. This nearly level, very poorly drained soil is in depressions. Individual areas range from 4 to 50 acres in size. Slopes are concave and are less than 2 percent.

Typically, the surface layer is dark gray fine sand about 4 inches thick. The subsurface layer is light gray and grayish brown fine sand to a depth of about 50 inches. The subsoil to a depth of 66 inches is grayish brown sandy loam that has pockets of brown fine sand. The substratum to a depth of 80 inches or more is olive gray loamy fine sand that has pockets of brown fine sand.

Included with this soil in mapping are small areas of Floridana, Manatee, Malabar, and Pineda soils. Also included are soils that are similar to the Holopaw soil but have a surface layer of muck or mucky fine sand less than 15 inches thick. Included soils make up less than 20 percent of the map unit.

The Holopaw soil is ponded for 6 to 9 months or more each year. The water table is within 12 inches of the surface for 2 to 4 months of the year and at a depth of 12 to 40 inches during most of the remainder of the year. Permeability is rapid in the surface layer and subsurface layer and moderately slow or moderate in the subsoil. The available water capacity is low. Natural fertility and the organic matter content also are low.

The natural vegetation is blue maidencane, broomsedge, St. Johnswort, waxmyrtle, panicum, sand cordgrass, white bracted sedge, pipewort, stiff paspalum, and various other water-tolerant weeds and grasses. Areas of this soil provide excellent habitat for wading birds and other wetland wildlife.

Under natural conditions, this soil is not suitable for cultivated crops. Even if a water-control system protects the soil from ponding and removes excess water rapidly, the suitability for vegetable crops is poor. Crop rotations, soil-improving crops, and crop residue management help to control erosion and maintain the organic matter content. Seedbed preparation should include bedding of rows. Fertilizer should be applied according to the needs of the crop.

The suitability of this soil for citrus trees is poor. A water-control system that maintains good drainage to a depth of about 4 feet is needed. Planting the trees on beds lowers the effective depth of the water table. A close-growing cover crop between the tree rows helps to control soil blowing. Regular applications of fertilizer are needed.

The suitability of this soil for pasture and hay crops is fair. Pangolagrass and improved bahiagrass grow well in properly managed areas. A water-control system is needed to remove excess surface water after heavy rains. Regular applications of fertilizer are needed. Overgrazing should be prevented.

This soil is not suitable for the commercial production of pine trees because of the long periods of ponding.

This soil is moderately suited to the production of desirable range plants. The dominant forage is maidencane and cutgrass. Grazing is naturally deferred when the water table is near the surface. This rest period increases forage production, but the high water levels reduce the grazing value of the site. The soil is in the Freshwater Marshes and Ponds range site.

This soil is severely limited as a site for buildings, sanitary facilities, and recreational uses. Water-control measures are needed. Sealing or lining sewage lagoons and trench sanitary landfills with impervious soil material helps to control seepage. Fill material is needed on sites for septic tank absorption fields, local roads and streets, small commercial buildings, and playgrounds. The sides of shallow excavations should be shored. Mounding may be needed on sites for septic tank absorption fields.

The capability subclass is VIIw.

24—Kesson and Wulfert mucks, frequently flooded. These nearly level, very poorly drained soils are in tidal marshes and tidal swamps adjacent to coastal islands and estuaries. Individual areas are irregular in shape and range from about 2 to 80 acres in size. Slopes are smooth and are less than 1 percent.

The components of this map unit do not occur in a regular and repeating pattern. Some areas are entirely Kesson and similar soils, some are entirely Wulfert and similar soils, and some are made up of Kesson, Wulfert, and other soils. The Kesson and similar soils make up about 50 percent of the map unit, and the Wulfert and similar soils make up about 40 percent.

Typically, the surface layer of the Kesson soil is dark reddish brown muck about 7 inches thick. The underlying material to a depth of more than 80 inches is gray, grayish brown, and dark greenish gray fine sand. Shell fragments are common in the underlying material.

Typically, the upper 38 inches of the Wulfert soil is black muck. The underlying material to a depth of more than 80 inches is dark gray and grayish brown fine sand.

Included with these soils in mapping are small areas of Beaches and St. Augustine soils. Also included are soils that are similar to the Kesson soil but have an organic surface layer 8 to 15 inches thick. Included soils make up less than 10 percent of the map unit.

Under natural conditions, the Kesson and Wulfert soils are flooded during normal high tides. Permeability is moderately rapid or rapid. The available water capacity and natural fertility are high for saltwater-tolerant plants. The organic matter content is very high.

The native vegetation is red, black, and white mangroves. Searocket, saltwort, perennial glasswort, seashore saltgrass, and seashore paspalum grow in some areas.

Because of the tidal flooding, these soils are not suited to cropland, citrus, improved pasture, rangeland, woodland, or urban uses. They are in the Mangrove Swamp ecological plant community.

These soils are in mangrove swamps (fig. 6), which are unique, biologically productive areas that are very important to many species of fish and wildlife. Many sport and commercial finfish, shellfish, and other crustaceans use these areas as spawning grounds and nurseries. Birds use the areas as rookeries and feeding grounds. Mangrove swamps also serve as protective barriers against excessive wave action in estuaries during tropical storms.

The capability subclass is VIIIw.

25—Malabar fine sand. This nearly level, poorly drained soil is in low, narrow to broad sloughs and poorly defined drainageways and on flats. Individual areas range from 20 to 250 acres in size. Slopes are smooth or concave and range from 0 to 2 percent.

Typically, the surface layer is very dark gray fine sand about 4 inches thick. The subsurface layer to a depth of 13 inches is gray fine sand. The subsoil is brownish yellow and reddish yellow fine sand in the upper 32 inches, dark grayish brown sandy clay loam in the next 5 inches, and light gray sandy loam in the lower 30 inches.

Included with this soil in mapping are small areas of Felda, Pineda, Pompano, and Wabasso soils. Also included are soils in small depressional areas that are ponded. Included soils make up less than 15 percent of the map unit.

The Malabar soil has a water table within 12 inches of the surface for 2 to 6 months and at a depth of 12 to 40 inches for most of each year. Permeability is rapid in the surface layer and subsurface layer and in the upper part of the subsoil. It is slow or very slow in the lower part of the subsoil. The available water capacity is low. Natural fertility and the organic matter content also are low.

Most areas of this soil support natural vegetation of

Figure 6.—An area of Kesson and Wulfert mucks, frequently flooded, in a mangrove swamp. Mangrove trees are the dominant vegetation.

slash pine, South Florida slash pine, longleaf pine, oaks, cabbage palm, scattered saw palmetto, waxmyrtle, inkberry, maidencane, creeping bluestem, pineland threeawn, laurel oak, bulrush, greenbrier, panicum, and various other sedges and grasses.

This soil is poorly suited to cultivated crops. It is moderately well suited to vegetable crops, however, if a water-control system removes excess surface water rapidly and provides water through subsurface irrigation during dry periods. Soil-improving crops and crop residue management help to control erosion and maintain the organic matter content. Seedbed preparation should include bedding of rows. Fertilizer should be applied according to the needs of the crop.

The suitability of this soil for citrus trees is good if a water-control system maintains the water table below a depth of about 4 feet. Planting the trees on beds results in good surface drainage. A close-growing cover crop between the tree rows helps to control soil blowing. Regular applications of fertilizer are needed.

The suitability of this soil for pasture and hay crops is good. Pangolagrass, improved bahiagrass, and clover grow well in properly managed areas. Management should include a water-control system that removes excess surface water after heavy rains, regular applications of fertilizer, and controlled grazing.

The potential productivity of this soil for pine trees is moderately high. South Florida slash pine and slash pine are suitable for planting. Water-control measures are needed. The equipment limitation and seedling mortality are the main management concerns.

This soil is well suited to the production of desirable range plants. The dominant forage is creeping bluestem, chalky bluestem, and blue maidencane. Management should include deferred grazing and brush control. The soil is in the Cabbage Palm Flatwoods range site.

This soil is severely limited as a site for buildings, sanitary facilities, and recreational uses. Water-control measures and fill material are needed. Sealing or lining sewage lagoons and trench sanitary landfills with impervious soil material helps to prevent seepage.

Mounding may be needed on sites for septic tank absorption fields. The sandy surface layer should be stabilized on sites for recreational uses. The sides of shallow excavations should be shored.

The capability subclass is IVw.

26—Manatee loamy fine sand, depressional. This nearly level, very poorly drained soil is in depressions. Individual areas range from 5 to 50 acres in size. Slopes are concave and are less than 1 percent.

Typically, the surface layer is black loamy fine sand about 18 inches thick. The subsoil is very dark gray sandy loam in the upper 11 inches and light gray sandy loam in the lower 13 inches. The substratum to a depth of 80 inches is gray and dark greenish gray sandy loam, sandy clay loam, and fine sand.

Included with this soil in mapping are small areas of Felda, Floridana, Holopaw, Malabar, and Pineda soils. Also included are soils that are similar to the Manatee soil but have a surface layer of muck more than 15 inches thick. Included soils make up less than 20 percent of the map unit.

The Manatee soil is ponded for 6 to 9 months or more during most years. The water table is within 12 inches of the surface during most of the rest of the year. Permeability is moderately rapid in the surface layer and moderate in the subsoil and substratum. The available water capacity is moderate. Natural fertility is medium, and the organic matter content is high.

The natural vegetation is sawgrass, maidencane, and pickerelweed. Some areas support red maple, cypress, blackgum, cabbage palm, loblollybay gordonia, sweetbay, scattered waxmyrtle, sedges, ferns, and other water-tolerant grasses. Areas of this soil provide excellent habitat for wading birds and other wetland wildlife.

This soil is not suited to cultivated crops because of the ponding. Establishing an adequate drainage system is difficult because most areas do not have a suitable drainage outlet. The suitability for many vegetable crops is fair, however, if intensive management and soil-improving measures are applied and if a water-control system removes excess water rapidly. Adequate seedbed preparation and crop rotations are needed. Seedbed preparation should include bedding of rows. Soil-improving crops and crop residue management help to control erosion and maintain the organic matter content. Fertilizer and lime should be applied according to the needs of the crop.

In its natural state, this soil is not suited to citrus trees. The suitability is poor even if intensive management, such as bedding of rows, is applied and the water-control system is adequate.

This soil is poorly suited to improved pasture. Intensive management and soil-improving measures should be applied, and a water-control system should be installed to remove excess surface water rapidly after heavy rains. Pangolagrass and improved bahiagrass grow well in properly managed areas. Regular applications of fertilizer and lime are needed. Overgrazing should be prevented.

This soil is not suitable for the commercial production of pine trees because of the extensive periods of ponding.

This soil is moderately suited to the production of desirable range plants. The dominant forage is maidencane and cutgrass. Grazing is naturally deferred when the water table is close to the surface. This rest period increases forage production, but the high water levels reduce the grazing value of the site. The soil is in the Freshwater Marshes and Ponds range site.

The ponding severely limits the suitability of this soil as a site for buildings, sanitary facilities, and recreational uses. Water-control measures are needed. Fill material is needed on sites for urban uses. Sealing or lining sewage lagoons and trench sanitary landfills with impervious soil material helps to prevent seepage. The sides of shallow excavations should be shored. Mounding may be needed on sites for septic tank absorption fields.

The capability subclass is VIIw.

27—Matlacha gravelly sand. This nearly level, somewhat poorly drained soil formed in dredge and fill material from small manmade harbors. The material was spread over the surface of former tidal areas. The mineral soils in these areas are very poorly drained. The fill material consists of a mixture of sand, limestone, shell fragments, and loamy and silty sediments. Individual areas are adjacent to coastal areas and are about 10 to 100 acres in size. Slopes are smooth and range from 0 to 3 percent.

Typically, the upper 42 inches is dark brown, light brownish gray, and very pale brown gravelly sand that has lenses of sandy clay loam and is about 20 percent limestone and shell fragments. Below this to a depth of 80 inches or more is undisturbed fine sand. The upper 4 inches of the fine sand is dark gray, the next 32 inches is light gray, and the lower 2 inches is very dark grayish brown.

Included with this soil in mapping are small areas of fill material that does not have loamy pockets or layers. Also included are areas of soils that have an organic layer at a depth of more than 60 inches and areas of soils that are poorly drained. Included soils make up less than 15 percent of the map unit.

Depth to the water table in the Matlacha soil varies, depending on the amount of fill material and the extent of artificial drainage. The water table is at a depth of 24 to 36 inches for 2 to 4 months during most years. It is below a depth of 60 inches during extended dry periods. The available water capacity varies but is estimated to be low. Permeability varies within short distances but is estimated to be moderately rapid in the fill material and rapid in the underlying material. Natural fertility is low.

Most of the acreage supports stands of pine, Brazilian pepper, sea daisy, and weedy grasses. Some areas have been developed for urban uses.

This soil is not used for cropland, improved pasture, citrus trees, woodland, wildlife habitat, or rangeland. It consists of mixed soil material used as fill to make low tidal areas better suited to building site development or other urban uses. The suitability for urban uses is fair. The wetness and brief periods of flooding are limitations. Onsite investigation is recommended for all uses.

The capability subclass is VIs.

29—Orsino fine sand. This nearly level and gently sloping, moderately well drained soil is on ridges and knolls. It is slightly higher on the landscape than the surrounding flatwoods. Individual areas range from 40 to 100 acres in size. Slopes are smooth or convex.

Typically, the surface layer is gray fine sand about 6 inches thick. The subsurface layer is light gray fine sand to a depth of about 18 inches. The subsoil to a depth of 22 inches is dark reddish brown and brown fine sand that has discontinuous lenses of brown and reddish brown fine sand. The next layer is very pale brown fine sand to a depth of 40 inches. Below this to a depth of 80 inches is light gray fine sand.

Included with this soil in mapping are small areas of EauGallie, Pomello, and Myakka soils. These soils make up less than 15 percent of the map unit.

Under natural conditions, the Orsino soil has a water table at a depth of 40 to 60 inches for 6 months or more during most years. The water table recedes to a depth of more than 60 inches during droughty periods. Permeability is very rapid. The available water capacity is very low. Natural fertility and the organic matter content also are very low.

Most areas of this soil support natural vegetation of slash pine, South Florida slash pine, sand pine, longleaf pine, scattered turkey oak, and sand live oak. The understory is pineland threeawn, indiangrass, bluestems, grassleaf goldaster, and various other grasses and forbs.

The suitability of this soil for citrus trees is fair. A close-growing cover crop between the tree rows helps to control erosion. High yields of fruit can be obtained in some years without irrigation, but an irrigation system generally is necessary.

This soil is poorly suited to cultivated crops. Droughtiness and rapid leaching of plant nutrients reduce the variety of suitable crops and the crop yields. Row crops should be planted on the contour and in strips that alternate with strips of close-growing crops. The close-growing crops should be included in the cropping sequence at least 3 out of every 4 years. Soil-improving crops and crop residue management help to control erosion and maintain the organic matter content. An intensively managed irrigation system is needed. Fertilizer and lime should be applied according to the needs of the crop.

The suitability of this soil for pasture and hay crops is fair. Deep-rooted plants, such as coastal bermudagrass and bahiagrass, are suitable, but drought reduces the yields. Regular applications of fertilizer and lime are needed. Overgrazing should be prevented.

The potential productivity of this soil for pine trees is moderate. The equipment limitation, seedling mortality, and plant competition are the main management concerns. South Florida slash pine, slash pine, and longleaf pine are suitable for planting.

This soil is poorly suited to the production of desirable range plants. The vegetative community is a dense understory of saw palmetto, Florida rosemary, and scrub oak. Although seldom grazed by livestock, this site protects the livestock during winter. The soil is in the Sand Pine Scrub range site.

This soil is moderately limited as a site for septic tank absorption fields. An increase in the size of the absorption field may be needed. The proximity to a stream or canal should be considered because the effluent can pollute water sources. Limitations are slight on sites for dwellings without basements, for small commercial buildings, and for local roads and streets and are moderate on sites for dwellings with basements. Land shaping may be needed. The soil is severely limited as a site for trench sanitary landfills, shallow excavations, and recreational uses. Sealing or lining sewage lagoons and trench sanitary landfills with impervious soil material helps to prevent seepage. Water-control measures are needed to lower the water table. The sides of shallow excavations should be shored. The sandy surface layer should be stabilized on sites for recreational uses.

The capability subclass is IVs.

30—Ona fine sand. This nearly level, poorly drained soil is on broad flatwoods. Individual areas range from 5 to 125 acres in size. Slopes are smooth and range from 0 to 2 percent.

Typically, the surface layer is dark gray fine sand about 6 inches thick. The subsoil is dark reddish brown and dark brown fine sand to a depth of about 16 inches. Below this to a depth of 80 inches or more is brown and gray fine sand.

Included with this soil in mapping are small areas of EauGallie, Myakka, Pomello, and Pompano soils. Some areas of the Myakka soils are depressional. Also included are areas of soils that are similar to the Ona soil but have a surface layer more than 9 inches thick. Included soils make up about 15 percent of the map unit.

Under natural conditions, the Ona soil has a water table within a depth of 40 inches for more than 6 months during most years and at a depth of 6 to 18 inches for 1 to 3 months during wet periods. Permeability is rapid in the surface layer and substratum and moderate in the subsoil. The available water capacity is low. Natural fertility and the organic matter content are low or medium.

Most areas of this soil support natural vegetation of slash pine, South Florida slash pine, and longleaf pine and scattered live oak, inkberry, fetterbush, waxmyrtle, pineland threeawn, bluestems, panicum, and various other grasses.

The suitability of this soil for citrus trees is good if a water-control system is installed to maintain the water table below a depth of about 4 feet. Planting the trees on beds lowers the effective depth of the water table. Regular applications of lime and fertilizer are needed.

Under natural conditions, this soil is poorly suited to cultivated crops because of the wetness and the sandy texture in the root zone. The suitability for many vegetable crops is good, however, if a water-control system removes excess water during wet periods and provides water through subsurface irrigation during dry periods. Soil-improving crops and crop residue management help to control erosion and maintain the organic matter content. Seedbed preparation should include bedding of rows. Regular applications of fertilizer and lime are needed.

The suitability of this soil for improved pasture is good. Pangolagrass, improved bahiagrass, and white clover grow well in properly managed areas. Water-control measures are needed to remove excess surface water after heavy rains. Regular applications of lime and fertilizer are needed. Overgrazing should be prevented.

The potential productivity of this soil for pine trees is moderate. The equipment limitation, seedling mortality, and plant competition are the main management concerns. South Florida slash pine and slash pine are suitable for planting.

This soil is moderately suited to the production of desirable range plants. The dominant forage is creeping bluestem, lopsided indiangrass, pineland threeawn, South Florida bluestem, and chalky bluestem. Management should include deferred grazing and brush control. The soil is in the South Florida Flatwoods range site.

This soil is severely limited as a site for buildings, sanitary facilities, and recreational uses. Water-control measures are needed. An increase in the size of septic tank absorption fields may be needed. Sealing or lining sewage lagoons with impervious soil material helps to prevent seepage. The sandy surface layer should be stabilized on sites for recreational uses. The sides of shallow excavations should be shored.

The capability subclass is IIIw.

31—Pineda fine sand. This nearly level, poorly drained soil is on low hammocks and in broad, poorly defined sloughs. Individual areas range from 10 to 200 acres in size. Slopes are smooth or concave and range from 0 to 2 percent.

Typically, the surface layer is dark gray fine sand about 8 inches thick. The subsurface layer is 14 inches of gray fine sand. The upper 14 inches of the subsoil is dark yellowish brown and pale brown fine sand. The lower 12 inches is light brownish gray fine sandy loam mottled with dark yellowish brown. The substratum to a depth of 80 inches or more is grayish brown and dark grayish brown fine sand.

Included with this soil in mapping are small areas of EauGallie, Felda, Malabar, and Pople soils. Also included are a few areas of soils that have a thin layer of very friable, calcareous material at a depth of 10 to 30 inches. Included soils make up less than 20 percent of the map unit.

The Pineda soil has a water table that is above the surface for a short period after heavy rainfall. The water table is within 12 inches of the surface for 1 to 6 months and at a depth of 20 to 40 inches for more than 6 months. The available water capacity is low. Permeability is rapid in the surface layer and subsurface layer and in the upper part of the subsoil, slow or very slow in the lower part of the subsoil, and moderately rapid in the substratum. Natural fertility and the organic matter content are low.

A large part of the acreage of this soil has been cleared and supports citrus trees. The natural vegetation is scattered slash pine, South Florida slash pine, longleaf pine, cabbage palm, waxmyrtle, scattered saw palmetto, blue maidencane, pineland threeawn, low panicum, bluestems, and various weeds and grasses.

This soil is severely limited if it is used for cultivated crops. The suitability for vegetable crops is fair if a water-control system removes excess water rapidly during wet periods and provides water through subsurface irrigation during dry periods. Soil-improving crops and crop residue management help to control erosion and maintain the organic matter content. Seedbed preparation should include bedding of rows. Fertilizer should be applied according to the needs of the crop.

The suitability of this soil for citrus trees is good if a water-control system maintains the water table below a depth of about 4 feet. Planting the trees on beds results in good surface drainage. A close-growing cover crop between the tree rows helps to control soil blowing. Regular applications of fertilizer are needed.

The suitability of this soil for pasture and hay crops is good. Pangolagrass, improved bahiagrass, and clover grow well in properly managed areas. A water-control system is needed to remove excess surface water after heavy rains. Management should include regular applications of fertilizer and controlled grazing.

The potential productivity of this soil for pine trees is moderately high. Slash pine and South Florida slash pine are suitable for planting. Water-control measures are necessary. The equipment limitation and seedling mortality are the main management concerns.

This soil is well suited to the production of desirable range plants. The dominant forage is blue maidencane, chalky bluestem, and bluejoint panicum. Management should include deferred grazing. The soil is in the Slough range site.

This soil is severely limited as a site for buildings, sanitary facilities, and recreational uses. Water-control measures are needed. Sealing or lining sewage lagoons with impervious soil material helps to prevent seepage. Mounding may be needed on sites for septic tank absorption fields. The sandy surface layer should be stabilized on sites for recreational uses. The sides of shallow excavations should be shored.

The capability subclass is IIIw.

32—Pits and Dumps. This map unit consists of excavated areas where limestone and phosphate have been mined. The refuse from mining activities has been left on the adjoining land. Several areas are in the northern part of the county. Most areas have been abandoned.

Excavations made to obtain marl, shells, clay, or other material for road construction or fill and the waste material from these excavations are part of this unit.

This map unit is not used for cropland, improved pasture, citrus, woodland, or rangeland. Some revegetated areas provide good wildlife habitat. Onsite investigation is recommended for all uses.

This map unit is not assigned to a capability subclass.

33—Pomello fine sand. This nearly level, moderately well drained soil is on low ridges and knolls on flatwoods. Individual areas range from 20 to 150 acres in size. Slopes are smooth or convex.

Typically, the surface layer is dark gray fine sand about 4 inches thick. The subsurface layer to a depth of about 48 inches is light gray fine sand. The subsoil to a depth of about 80 inches or more is dark reddish brown fine sand.

Included with this soil in mapping are small areas of EauGallie and Tavares soils and areas of soils that are similar to the Pomello soil but have a thin, brownish yellow layer directly below the surface layer. Also included are areas of soils that have a subsoil below a depth of 50 inches and areas of soils that have a weakly cemented subsoil. Included soils make up less than 15 percent of the map unit.

Under natural conditions, the Pomello soil usually has a water table at a depth of 24 to 40 inches for 1 to 4 months during wet periods and at a depth of 40 to 60 inches during the drier periods. Permeability is very rapid in the surface layer and subsurface layer and moderately rapid in the subsoil. The available water capacity is low. Natural fertility and the organic matter content are very low.

Most areas of this soil support natural vegetation of slash pine, South Florida slash pine, longleaf pine, scrub live oak, saw palmetto, fetterbush, rusty lyonia, running oak, indiangrass, pineland threeawn, grassleaf goldaster, flag pawpaw, mosses, lichens, panicum, bluestems, and various other grasses. Sand pine grows in some areas.

This soil is poorly suited to citrus trees. Only fair yields can be obtained even if the level of management is high. A water-control system is necessary to maintain the water table below a depth of about 4 feet during wet periods and to provide water for irrigation during dry periods. Regular applications of fertilizer and lime are needed. A suitable cover crop between the tree rows helps to control soil blowing.

This soil is poorly suited to cultivated crops. If intensive management is applied, however, a few crops can be grown. The number of suitable crops is limited unless intensive management is applied. Irrigation is needed. Fertilizer and lime should be applied according to the needs of the crop.

The suitability of this soil for improved pasture grasses is fair. Bahiagrass is the best suited species. Droughtiness is the major limitation during the drier periods. Regular applications of lime and fertilizer are needed. Overgrazing should be prevented.

The potential productivity of this soil for pine trees is moderate. Seedling mortality, plant competition, and the equipment limitation are the main management concerns. South Florida slash pine, slash pine, and longleaf pine are suitable for planting.

This soil is poorly suited to the production of desirable range plants. The vegetative community is a dense understory of saw palmetto, Florida rosemary, and scrub oak. Although seldom grazed by livestock, this site protects the livestock during winter. The soil is in the Sand Pine Scrub range site.

This soil is limited as a site for buildings, sanitary facilities, and recreational uses. Limitations are moderate on sites for dwellings without basements and for small commercial buildings. Water-control measures are needed. An increase in the size of septic tank absorption fields may be needed. Because of the very rapid permeability, the effluent in septic tank absorption fields can pollute ground water. Applying water-control measures and sealing or lining sewage lagoons and trench sanitary landfills with impervious soil material help to prevent seepage. The sandy surface layer should be stabilized on sites for recreational uses. The sides of shallow excavations should be shored.

The capability subclass is VIs.

34—Pompano fine sand, depressional. This nearly level, very poorly drained soil is in depressions. Individual areas range from 5 to 100 acres in size. Slopes are concave and are 0 to 1 percent.

Typically, the surface layer is black fine sand about 3 inches thick. The upper 13 inches of the underlying material is gray fine sand, and the lower 64 inches or more is light brownish gray and grayish brown fine sand.

Included with this soil in mapping are small areas of Delray, Felda, and Holopaw soils and small areas of soils that are similar to the Pompano soil but have an organic surface layer as much as 20 inches thick. Also included are small areas of soils that have a weakly stained layer of organic material at a depth of more than 20 inches. Included soils make up less than 20 percent of the map unit.

The Pompano soil is ponded for 6 to 9 months during most years. The water table is within 12 inches of the surface for most of the remainder of the year. Permeability is rapid. The available water capacity is very low. Natural fertility and the organic matter content are low.

The natural vegetation is baldcypress, scattered blackgum, loblollybay gordonia, sweetbay, cabbage palm, red maple, waxmyrtle, Carolina willow, St. Johnswort, maidencane, stiff paspalum, sedges, and other water-tolerant weeds and grasses. Areas of this soil provide excellent habitat for wading birds and other wetland wildlife.

Under natural conditions, this soil is not suited to cultivated crops because of the ponding. Establishing an adequate drainage system is difficult because most areas do not have a suitable drainage outlet. Even if intensive management and soil-improving measures are applied and a water-control system removes excess water rapidly, the suitability for vegetable crops is poor. Adequate seedbed preparation and crop rotations are needed. Seedbed preparation should include bedding of rows. Soil-improving crops and crop residue management help to control erosion and maintain the organic matter content. Fertilizer and lime should be applied according to the needs of the crop.

In its natural state, this soil is not suited to citrus trees. The suitability is poor even if intensive management, such as bedding of rows, is applied and the water-control system is adequate.

In its natural state, this soil is poorly suited to improved pasture. The suitability is fair, however, if an adequate water-control system removes excess surface water after heavy rains. Pangolagrass, improved bahiagrass, and white clover grow well in properly managed areas. Controlled grazing is needed.

This soil is not suitable for the commercial production of pine trees because of the extensive periods of ponding.

This soil generally is not used as rangeland. It is in the Cypress Swamp ecological plant community.

This soil is severely limited as a site for buildings, sanitary facilities, and recreational uses because of the ponding. Water-control measures are needed. Fill material is needed on sites for urban uses. Sealing or lining sewage lagoons and trench sanitary landfills with impervious soil material helps to prevent seepage. The sides of shallow excavations should be shored. Mounding may be needed on sites for septic tank absorption fields.

The capability subclass is VIIw.

36—Pople fine sand. This nearly level, poorly drained soil is on low hammocks and in poorly defined drainageways and broad sloughs. Individual areas range from 20 to 50 acres in size. Slopes are smooth or concave and range from 0 to 2 percent.

Typically, the surface layer is very dark grayish brown fine sand about 4 inches thick. The subsurface layer is light brownish gray fine sand about 3 inches thick. The subsoil is brown and brownish yellow fine sand in the upper 21 inches and gray fine sandy loam in the lower 28 inches. The substratum to a depth of 80 inches is gray fine sand.

Included with this soil in mapping are small areas of Bradenton, EauGallie, and Wabasso soils. Also included are areas of soils that have a weakly stained layer of organic material above the subsoil and extending into the subsoil and areas of soils that have small fragments or nodules of iron-cemented sandstone or calcareous material at a depth of 10 to 30 inches. Included soils make up less than 15 percent of the map unit.

The Pople soil has a water table within 12 inches of the surface for 1 to 6 months and at a depth of 12 to 40 inches for more than 6 months. The water table recedes to a depth of more than 40 inches during extended dry periods and is above the surface for short periods after heavy rainfall. The available water capacity is low. Permeability is rapid in the surface layer and subsurface layer, slow or very slow in the loamy part of the subsoil, and moderate or moderately slow in the substratum. Natural fertility and the organic matter content are low.

Most areas have been cleared and support citrus trees. The natural vegetation is slash pine, South Florida slash pine, longleaf pine, cabbage palm, waxmyrtle, scattered saw palmetto, laurel oak, blue maidencane, pineland threeawn, creeping bluestem, South Florida bluestem, sand cordgrass, low panicum, and various weeds and grasses.

Under natural conditions, this soil is poorly suited to cultivated crops. It is fairly well suited to vegetable crops, however, if a water-control system removes excess water rapidly in wet periods and provides water through subsurface irrigation in dry periods. Soil-improving crops and crop residue management help to control erosion and maintain the organic matter content. Seedbed preparation should include bedding of rows. Fertilizer should be applied according to the needs of the crop.

The suitability of this soil for citrus trees is good if a water-control system maintains the water table below a depth of about 4 feet. Planting the trees on beds results in good surface drainage. A close-growing cover crop between the tree rows helps to control soil blowing. Regular applications of fertilizer are needed.

The suitability of this soil for pasture and hay crops is good. Pangolagrass, improved bahiagrass, and clover grow well in properly managed areas. Management should include a water-control system that removes excess surface water after heavy rains, regular applications of fertilizer, and controlled grazing.

The potential productivity of this soil for pine trees is moderately high. South Florida slash pine and slash pine are suitable for planting. Water-control measures are necessary. The equipment limitation and seedling mortality are the main management concerns.

This soil is well suited to the production of desirable range plants. The dominant forage is creeping bluestem, chalky bluestem, and blue maidencane. Management should include deferred grazing and brush control. The soil is in the Cabbage Palm Flatwoods range site.

This soil is severely limited as a site for buildings, sanitary facilities, and recreational uses. Water-control measures are needed. Sealing or lining sewage lagoons and trench sanitary landfills with impervious soil material generally helps to prevent seepage. Mounding sites for septic tank absorption fields helps to control wetness. The sandy surface layer should be stabilized on sites for recreational uses. The sides of shallow excavations should be shored.

The capability subclass is IIIw.

38—Smyrna fine sand. This nearly level, poorly drained soil is on broad flatwoods. Individual areas range from 10 to 50 acres in size. Slopes are smooth and range from 0 to 2 percent.

Typically, the surface layer is dark gray fine sand about 7 inches thick. The subsurface layer is light gray fine sand to a depth of about 12 inches. The subsoil to a depth of about 30 inches is dark reddish brown fine sand. The substratum to a depth of 80 inches or more is pale brown and very pale brown fine sand.

Included with this soil in mapping are small areas of EauGallie, Pompano, and Ona soils. Also included are areas of soils that are similar to the Smyrna soil but have a thicker dark surface layer. Included soils make up about 15 percent of the map unit.

Under natural conditions, the Smyrna soil usually has a water table within a depth of 40 inches for more than 6 months and at a depth of 6 to 18 inches for 1 to 3 months. Permeability is rapid in the surface layer, subsurface layer, and substratum and moderate or moderately rapid in the subsoil. The available water capacity is low. Natural fertility and the organic matter content also are low.

Most areas of this soil support natural vegetation of slash pine, South Florida slash pine, longleaf pine, live oak, and water oak. The understory is saw palmetto, running oak, inkberry, fetterbush, waxmyrtle, pineland threeawn, bluestems, panicum, and other grasses.

The suitability of this soil for citrus trees is good if a water-control system maintains the water table below a depth of about 4 feet. Planting the trees on beds lowers the effective depth of the water table. A suitable cover crop between the tree rows helps to control erosion. Regular applications of lime and fertilizer are needed.

This soil is very severely limited if it is used for cultivated crops because of the wetness and the sandy texture in the root zone. The suitability for many vegetable crops is fair, however, if a water-control system removes excess water in wet periods and provides water through subsurface irrigation in dry periods. Soil-improving crops and crop residue management help to control erosion and maintain the organic matter content. Seedbed preparation should include bedding of rows. Fertilizer and lime should be applied according to the needs of the crop.

The suitability of this soil for improved pasture is good. Pangolagrass, improved bahiagrass, and white clover grow well in properly managed areas. Water-control measures generally are needed. Regular applications of lime and fertilizer also are needed. Overgrazing should be prevented.

The potential productivity of this soil for pine trees is moderate. The equipment limitation, seedling mortality, and plant competition are the main management concerns. South Florida slash pine and slash pine are suitable for planting.

This soil is moderately suited to the production of desirable range plants. The dominant forage is creeping bluestem, lopsided indiangrass, pineland threeawn, and chalky bluestem. Management should include deferred grazing and brush control. The soil is in the South Florida Flatwoods range site.

This soil is severely limited as a site for buildings, local roads and streets, shallow excavations, sewage lagoons, sanitary landfills, and recreational uses. Water-control measures are needed. Sealing or lining sewage lagoons and trench sanitary landfills with impervious soil material can help to prevent seepage. An increase in the size of septic tank absorption fields may be needed. The sandy surface layer should be stabilized on sites for recreational uses. The sides of shallow excavations should be shored.

The capability subclass is IVw.

39—St. Augustine fine sand. This nearly level, somewhat poorly drained soil formed in dredge and fill material from small manmade harbors. The material was spread over the surface of former tidal areas. The mineral soils in these areas are very poorly drained. The fill material is a mixture of sand, shell fragments, and loamy and silty sediments. Individual areas are adjacent to the coastal areas and are about 10 to 100 acres in size. Slopes are smooth and range from 0 to 2 percent.

Typically, the fill material is about 80 inches thick. It is brownish and grayish fine sand and sandy clay loam with sand-sized shell fragments.

Included with this soil in mapping are small areas of Matlacha soils and areas of fill material that does not have loamy pockets or layers. Also included are some areas of soils that have a thin or weakly expressed organic layer at a depth of more than 60 inches and some areas of soils that are poorly drained. Included soils make up less than 15 percent of the map unit.

The St. Augustine soil has a water table at a depth of 20 to 40 inches for 2 to 6 months in most years. The water table is within a depth of 20 inches during periods of heavy rainfall. In some areas daily tides affect the water table. This soil is flooded for brief periods during the hurricane season. Permeability is rapid or moderately rapid. The available water capacity is very low in the sandy part of the fill material.

Most of the acreage supports stands of Australian pine, Brazilian pepper, sea daisy, and weedy grasses. Some areas have been developed for urban uses.

This soil is not used for cropland, improved pasture, citrus trees, woodland, wildlife habitat, or rangeland. It consists of mixed soil material used as fill to make low tidal areas better suited to building site development or other urban uses. The suitability for urban uses is fair. The wetness and the flooding are limitations. Onsite investigation is recommended for all uses.

The capability subclass is VIIs.

40—Tavares fine sand. This nearly level, moderately well drained soil is on ridges and knolls on flatwoods. Individual areas range from 20 to 200 acres in size. Slopes are smooth or convex.

Typically, the surface layer is dark grayish brown fine sand about 6 inches thick. The upper 22 inches of the underlying material is brownish yellow sand, and the lower 52 inches or more is gray fine sand.

Included with this soil in mapping are small areas of Cassia, Orsino, and Pomello soils. These soils make up less than 15 percent of the map unit.

The Tavares soil usually has a water table at a depth of 40 to 60 inches during wet periods and at a depth of more than 80 inches during droughty periods. Permeability is very rapid throughout the profile. The available water capacity is very low. Natural fertility and the organic matter content also are very low.

Most areas of this soil support natural vegetation of slash pine, South Florida slash pine, longleaf pine, sand pine, saw palmetto, scrub oak, fetterbush, running oak, turkey oak, indiangrass, broomsedge bluestem and other bluestem species, and pineland threeawn.

In its natural state, this soil is poorly suited to cultivated crops. It is fairly well suited to citrus trees if good management is applied. Management should include irrigation and regular applications of fertilizer and lime. A close-growing cover crop between the trees helps to control soil blowing.

The suitability of this soil for improved pasture grasses is poor. Intensive management is needed to overcome the droughtiness and very low fertility. Bahiagrass is the best suited species. Clover is not suitable.

The potential productivity of this soil for pine trees is moderately high. Seedling mortality and the equipment

Figure 7.—A pastured area of Wabasso fine sand. Laurel oak and live oak provide shade for livestock.

limitation are the main management concerns. South Florida slash pine, slash pine, and longleaf pine are suitable for planting.

This soil is poorly suited to the production of desirable range plants. The vegetative community is a dense understory of saw palmetto, Florida rosemary, scrub oak, indiangrass, creeping bluestem, beaked panicum, and various other grasses and perennial legumes. Although seldom grazed by livestock, this site protects the livestock during winter. The soil is in the Longleaf Pine-Turkey Oak Hills range site.

This soil is well suited to dwellings without basements, to small commercial buildings, and to local roads and streets. No corrective measures are needed. The soil is severely limited as a site for septic tank absorption fields and recreational uses. Water-control measures are needed. The sandy surface layer should be stabilized on sites for recreational uses. The sides of shallow excavations should be shored. Limitations are severe on sites for trench sanitary landfills and sewage lagoons. Sealing or lining the landfills and lagoons with impervious soil material helps to prevent seepage.

The capability subclass is IIIs.

41—Wabasso fine sand. This nearly level, poorly drained soil is on broad flatwoods. Individual areas are 20 to 300 acres in size. Slopes are smooth and range from 0 to 2 percent.

Typically, the surface layer is black fine sand about 5 inches thick. The subsurface layer is gray fine sand about 3 inches thick. The upper 8 inches of the subsoil is very dark gray fine sand that is coated with colloidal organic matter. The next 7 inches is light gray fine sand. The lower 55 inches is dark gray sandy loam and fine sandy loam.

Included with this soil in mapping are small areas of EauGallie, Felda, and Myakka soils and areas of soils that are similar to the Wabasso soil but have a thicker dark surface layer. Also included are some areas of wet soils in scattered small depressions. Included soils make up less than 15 percent of the map unit.

The Wabasso soil usually has a water table within a depth of 40 inches for more than 6 months and at a depth of 6 to 18 inches for 1 to 2 months. The available water capacity is low. Permeability is rapid in the surface layer and subsurface layer. It is moderate in the sandy part of the subsoil and slow or very slow in the loamy part. Natural fertility is low.

Most areas of this soil support citrus trees, but some support natural vegetation of slash pine, South Florida slash pine, longleaf pine, scattered cabbage palm, water oak, live oak, saw palmetto, waxmyrtle, fetterbush, inkberry, pineland threeawn, bluestems, panicum, and other grasses.

The suitability of this soil for citrus trees is good if a water-control system maintains the water table below a depth of about 4 feet. Planting the trees on beds lowers the effective depth of the water table. A suitable cover crop between the tree rows helps to control erosion. Regular applications of lime and fertilizer are needed.

Because of the wetness and the sandy texture in the root zone, this soil is very severely limited if it is used for cultivated crops. The suitability for many vegetable crops is fair, however, if a water-control system removes excess water in wet periods and provides water through subsurface irrigation in dry periods. Soil-improving crops and crop residue management help to control erosion and maintain the organic matter content. Seedbed preparation should include bedding of rows. Fertilizer and lime should be applied according to the needs of the crop.

The suitability of this soil for pasture is good (fig. 7). Pangolagrass, improved bahiagrass, and white clover grow well in properly managed areas. Water-control measures are needed. Regular applications of lime and fertilizer also are needed. Overgrazing should be prevented.

The potential productivity of this soil for pine trees is moderately high. The equipment limitation, seedling mortality, and plant competition are the main management concerns. South Florida slash pine and slash pine are suitable for planting.

This soil is moderately suited to the production of desirable range plants. The dominant forage is creeping bluestem, lopsided indiangrass, pineland threeawn, and chalky bluestem. Management should include deferred grazing and brush control. The soil is in the South Florida Flatwoods range site.

This soil is severely limited as a site for buildings, local roads and streets, recreational uses, sewage lagoons, septic tank absorption fields, trench sanitary landfills, and shallow excavations. Water-control measures are needed. Sealing or lining sewage lagoons and trench sanitary landfills with impervious soil material helps to prevent seepage. An increase in the size of septic tank absorption fields may be needed because of the slow permeability. The sides of shallow excavations should be shored. The sandy surface layer should be stabilized on sites for recreational uses.

The capability subclass is IIIw.

Use and Management of the Soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help avoid soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavior characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis for predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as rangeland and woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreation facilities; and for wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help to prevent construction failures caused by unfavorable soil properties.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern that is in harmony with nature.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

Crops and Pasture

William F. Kuenstler, agronomist, Soil Conservation Service, helped prepare this section.

General management needed for crops and pasture is suggested in this section. The crops or pasture plants best suited to the soils, including some not commonly grown in the survey area, are identified; the system of land capability classification used by the Soil Conservation Service is explained; and the estimated yields of the main crops and hay and pasture plants are listed for each soil.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under "Detailed Soil Map Units." Specific information can be obtained from the local office of the Soil Conservation Service or the Cooperative Extension Service.

About 28,400 acres in the county was used for crops or improved pasture in 1983 *(3)*. About 1,600 acres was used for citrus crops; about 12,000 acres was used for other specialty crops, mainly cucumbers, tomatoes, cabbage, lettuce, celery, watermelons, sod, and nursery plants; and the rest was used for improved pasture. If economic conditions are favorable, eggplants, squash, and sweet corn can be grown. Oranges are the main citrus crop. Grapefruit and specialty fruits also are grown.

The acreage used as woodland or rangeland has gradually decreased as more and more land is used for urban development, citrus crops, or improved pasture. The acreage of vegetable crops has remained stable over the past several years. The acreage of improved pasture has increased slightly.

The following paragraphs describe the main concerns in managing the soils in the county for crops and pasture. The main management needs are measures that control water erosion and soil blowing, drainage and irrigation systems, and measures that maintain or improve fertility and tilth.

Water erosion is a hazard on disturbed soils in areas undergoing development. It can damage these soils if rains are intensive and the surface has no vegetation or mulch.

Loss of the surface layer through erosion is damaging for two reasons. First, productivity is reduced as the topsoil is lost and the subsoil is exposed. Second, erosion results in the sedimentation of streams and lakes. Control of erosion minimizes this pollution and improves the quality of water for municipal use, for recreation, and for fish and wildlife. Erosion-control measures, such as cover crops and vegetative filter strips, provide a protective cover, help to control runoff, and increase the rate of water infiltration.

Soil blowing is a hazard in unprotected, open areas of sandy and organic soils. It can damage the soils and tender crops in a few hours if winds are strong and the soil is dry and has no vegetation or surface mulch. Soil blowing reduces fertility by removing the finer soil particles and organic matter; damages or destroys crops through sandblasting; spreads disease, insects, and weed seeds; and creates health and cleaning problems. Control of soil blowing minimizes duststorms and improves air quality. Maintaining a good plant cover and surface mulch minimizes soil blowing.

Field windbreaks and vegetative wind barriers are plantings made at right angles to the prevailing wind and at specific intervals across the field. The interval depends on the erodibility of the soil and the susceptibility of the crop to the damage caused by sandblasting. Windbreaks and vegetative barriers reduce windspeed and the distance that the wind blows across the field. Field windbreaks of suitable trees and shrubs, such as eucalyptus, South Florida slash pine, and southern redcedar, and vegetative barriers of millet, small grain, sugarcane, and sorghum and sudangrass hybrids are effective in reducing the hazard of soil blowing and the extent of crop damage caused by sandblasting.

Clearing and disturbing only the minimum area needed for works and improvements reduce the runoff rate and the hazard of soil blowing. Mulching reduces the extent of the crop damage caused by runoff and soil blowing and improves moisture conditions for newly established vegetation.

Most of the mineral soils in the county have a sandy surface layer and are subject to soil blowing if they are plowed several weeks before planting. They generally should be plowed only a short time before planting.

Information about the design of erosion-control measures for each kind of soil is provided in "Water and Wind Erosion Control Handbook for Florida," available in local offices of the Soil Conservation Service.

Soil drainage is a major management concern on much of the acreage used for crops and pasture in the survey area. Under natural conditions, very poorly drained, depressional soils, such as Delray, Felda, Floridana, Gator, Holopaw, and Manatee soils, are so wet that production of the crops and pasture plants commonly grown in the county generally is not possible. Also, most of these soils have a low available water capacity and are droughty during dry periods. Therefore, a combination of drainage measures and irrigation systems is needed if the soils are used for intensive crop or forage production. The design of drainage and irrigation systems varies, depending on the kind of soil and the crops or pasture plants growing on the soil.

If the drainage and irrigation systems are adequate, vegetable and citrus crops can be grown on the poorly drained and very poorly drained soils (fig. 8) in the county. Successful citrus production requires more intensive management on these soils than on other soils. Citrus trees have a deep taproot and require a deep root zone. A high water table restricts the rooting depth. A surface and subsurface drainage system and an irrigation system are needed in areas used for intensive citrus production. Low-volume irrigation is gaining widespread use in the county. The design of both the drainage and irrigation systems varies, depending on the kind of soil and the citrus crop grown on the soil.

EauGallie, Malabar, Myakka, Ona, Smyrna, and Wabasso soils have a subsoil that is coated with organic matter, which slows the movement of water through the profile. These soils are wetter during rainy seasons and remain wet long after the rainy season is over.

When organic soils, such as Gator muck, are drained, the pore spaces are filled with air and the organic material subsides and oxidizes. Therefore, special drainage and irrigation systems are needed to control the depth and period of drainage. Oxidation and subsidence of these soils can be minimized by keeping the water table at the highest practical level for the crop and cultivation practices during the growing season and by raising the water table to the surface the rest of the time.

In some soils, such as Hallandale soils, hard limestone bedrock is within a depth of 20 inches, and in other soils, such as Boca soils, it is within a depth of 40 inches. These soils are saturated during rainy periods and droughty during dry periods. Because of the bedrock, installing drainage and irrigation systems is difficult.

Information about drainage and irrigation systems for each kind of soil is provided in the Technical Guide, which is available in local offices of the Soil Conservation Service.

Fertility is naturally low in most of the soils in the county. Most of the mineral soils have a sandy, light colored surface layer. Exceptions are Floridana soils and the Ona soils that have a dark surface layer.

Some of the mineral soils are sandy to a depth of 80 inches or more, some are sandy in the upper part and have a loamy subsoil below a depth of 40 inches, and

Figure 8.—A water-control system in an area of EauGallie and Myakka fine sands. This system lowers the water table during wet periods and provides irrigation water during dry periods.

some have a sandy subsoil that is coated with organic matter. The soils are rapidly leached of plant nutrients and do not respond so well as loamy soils to applications of fertilizer and management. Pompano soils are an example. Cassia and Tavares soils also are droughty and low in fertility and may be unsuited to most crops.

Most of the soils in the survey area have a strongly acid or very strongly acid surface layer. If the soils have never been limed, applications of ground limestone are needed to supply calcium and raise the pH level sufficiently for crops and pasture grasses to grow well. The levels of nitrogen, potassium, and available phosphorus are naturally low in most of the mineral soils. The organic soils, such as Gator soils, are low in most plant nutrients, except for nitrogen. The fertilizer applied to these soils should contain minor elements, especially copper. On all soils, additions of lime and fertilizer should be based on the results of soil tests, the needs of the crop, and the expected level of yields. The Cooperative Extension Service can help in determining the kinds and amounts of fertilizer and lime to be applied.

Soil tilth is an important factor affecting the germination of seeds and the infiltration of water into the soil. Soils with good tilth have granular structure and are porous. Most of the mineral soils in the county have a light colored, sandy surface layer in which the content of organic matter is low and tilth is poor.

Generally, mineral soils have weak structure or are structureless. During periods of heavy rainfall on dry soils that are low in content of organic matter, the colloidal material cements, forming a thin crust. The crust is hard when dry and is slightly impervious to water. It reduces the rate of water infiltration and increases the runoff rate. Regular additions of crop residue, manure, and other organic material can improve soil structure and prevent excessive crusting.

The pasture in the county is used to produce forage for beef cattle and dairy cattle. Cow-calf enterprises are the major beef cattle systems. Bahiagrass and pangolagrass are the main pasture plants. Excess grass is harvested for hay when the weather is favorable. The dairies chop green feed daily for feeding.

If drained, most of the poorly drained soils and some of the very poorly drained soils, such as Floridana and Manatee soils, are suited to pasture. The poorly drained and very poorly drained soils are suited to limpograss. They are well suited to legumes, such as white clover, if lime and fertilizer are applied and the pasture is well managed.

The pastures in many parts of the county have been greatly depleted by continued excessive grazing. Forage yields can be increased by applying lime and fertilizer, planting legumes, applying a system of rotation grazing, irrigating, and applying other good management measures. Differences in the amount and kind of pasture yields are closely related to the kind of soil. Pasture management is based on the relationship among soils, pasture plants, lime, fertilizer, and moisture. Further information about managing pasture can be obtained from local offices of the Cooperative Extension Service and the Soil Conservation Service.

Yields Per Acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 3. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors. The land capability classification of each map unit also is shown in the table.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations also are considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green manure crops; and harvesting that ensures the smallest possible loss.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in table 3 are grown in the county, but estimated yields are not listed because the acreage of such crops is small. The local office of the Soil Conservation Service or of the Cooperative Extension Service can provide information about the management and productivity of the soils for those crops.

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for use as cropland. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for rangeland, for woodland, and for engineering purposes.

In the capability system, soils are generally grouped at three levels: capability class, subclass, and unit. Only class and subclass are used in this survey.

Capability classes, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class I soils have few limitations that restrict their use.

Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class III soils have severe limitations that reduce the choice of plants or that require special conservation practices, or both.

Class IV soils have very severe limitations that reduce the choice of plants or that require very careful management, or both.

Class V soils are not likely to erode, but they have other limitations, impractical to remove, that limit their use.

Class VI soils have severe limitations that make them generally unsuitable for cultivation.

Class VII soils have very severe limitations that make them unsuitable for cultivation.

Class VIII soils and miscellaneous areas have limitations that nearly preclude their use for commercial crop production.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e, w, s,* or *c,* to the class numeral, for example, IIe. The letter *e* shows that the main hazard is the risk of erosion unless a close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c,* used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

There are no subclasses in class I because the soils of this class have few limitations. The soils in class V are subject to little or no erosion, but they have other limitations that restrict their use to pasture, rangeland, woodland, wildlife habitat, or recreation. Class V contains only the subclasses indicated by *w, s,* or *c.*

The land capability classification of each map unit is given in the section "Detailed Soil Map Units" and in table 3.

Woodland Management and Productivity

Bill Schilling, forester, Division of Forestry, Florida Department of Agriculture and Consumer Services, helped prepare this section.

About 55,000 acres in Sarasota County is commercial woodland that is privately owned *(3).* Nearly 19,000 acres of Myakka River State Park is in Sarasota County. Most of this acreage is managed as woodland. The rest of the land in the county is not classified as woodland but has definite potential for woodland *(16).*

South Florida slash pine is the most economically important and abundant tree in the county. It grows on the majority of the soils. It is used mainly for pulpwood, fenceposts, poles, and lumber production.

About 42 percent of the woodland supports wetland hardwoods (fig. 9). The major trees in these areas are live oak, laurel oak, and cabbage palm. Other species are red maple, sweetgum, and bay. The county has very little baldcypress. The wetland hardwoods grow in freshwater swamps, on the flood plains along the Myakka River, and in the major depressions in the county. Most of these forested areas have little value as commercial woodland, but they have very high value as watersheds, wildlife habitat, and recreational areas.

The acreage used for timber in the county has been reduced through the years because of intensive ranching enterprises, urban encroachment, and the lack of local markets for wood products. Management of the timber resource has generally consisted of natural regeneration after harvest cutting. Although not extensively used in woodland management, prescribed fire plays an important role in reducing the extent of "rough" and in exposing mineral soil that can be used as a seedbed for natural regeneration. It also improves the availability, desirability, and nutrient quality of the native forage. Further information about woodland management can be obtained from the Florida Division of Forestry, Soil Conservation Service, and the Cooperative Extension Service.

Soils vary in their ability to produce trees. Depth, fertility, texture, and available water capacity influence tree growth. Elevation, aspect, and climate determine the kinds of trees that can grow on a site. Available water capacity and depth of the root zone are major influences affecting tree growth. Elevation and aspect are of particular importance in mountainous areas.

This soil survey can be used by woodland managers planning ways to increase the productivity of woodland. Some soils respond better to applications of fertilizer than others, and some are more susceptible to landslides and erosion after roads are built and timber is harvested. On some soils special reforestation efforts are needed. In the section "Detailed Soil Map Units," the description of each map unit in the county suitable for timber includes information about productivity and the limitations that affect timber harvesting and timber production. The common forest understory plants also are specified. Table 4 summarizes this forestry information and rates the soils for a number of factors to be considered in management. *Slight, moderate,* and *severe* are used to indicate the degree of the major soil limitations to be considered in forest management.

The first tree listed for each soil under the column "Common trees" is the indicator species for that soil. An indicator species is a tree that is common in the area and that is generally the most productive on a given soil.

Table 4 indicates the *ordination symbol* for each soil. The first part of the ordination symbol, a number, indicates the potential productivity of a soil for the indicator species in cubic meters per hectare. The larger the number, the greater the potential productivity. Potential productivity is based on the site index and the point where the mean annual increment is greatest.

The second part of the ordination symbol, a letter, indicates the major kind of soil limitation affecting use and management. The letter *W* indicates a soil in which

Figure 9.—Wetland hardwoods in an area of Delray and Astor soils, frequently flooded.

excessive water, either seasonal or year-round, is a significant limitation, and the letter *S* indicates a dry, sandy soil.

Ratings of the *erosion hazard* indicate the probability that damage may occur if site preparation or harvesting activities expose the soil. The risk is *slight* if no particular preventive measures are needed under ordinary conditions; *moderate* if erosion-control measures are needed for particular silvicultural activities; and *severe* if special precautions are needed to control erosion for most silvicultural activities. Ratings of *moderate* or *severe* indicate the need for construction of higher standard roads, additional maintenance of roads, additional care in planning harvesting and reforestation activities, or the use of specialized equipment.

Ratings of *equipment limitation* indicate restrictions on the use of forest management equipment, year-round or seasonal, because of such soil characteristics as slope, wetness, stoniness, or susceptibility of the surface layer to compaction. As slope gradient and length increase, it becomes more difficult to use wheeled equipment. On the steeper slopes, tracked equipment must be used. On the steepest slopes, even tracked equipment cannot be operated and more sophisticated systems are needed. The rating is *slight* if equipment use is restricted by soil wetness for less than 2 months and if special equipment is not needed. The rating is *moderate* if the soil is so steep that wheeled equipment cannot be operated safely across the slopes, if soil wetness restricts equipment use from 2 to 6 months per year, if stoniness restricts the use of ground-based equipment, or if special equipment is needed to prevent or minimize soil compaction. The rating is *severe* if the soil is so steep that tracked equipment cannot be operated safely across the slopes, if soil wetness restricts equipment use for more than 6 months per year, if stoniness restricts the use of ground-based equipment, or if special equipment is needed to prevent or minimize soil compaction. Ratings of *moderate* or *severe* indicate the need to choose the best suited equipment and to carefully plan the timing of harvesting and other management activities.

Ratings of *seedling mortality* refer to the probability of death of naturally occurring or properly planted seedlings of good stock in periods of normal rainfall as influenced by kinds of soil or topographic features. Seedling mortality is caused primarily by too much water or too little water. The factors used in rating a soil for seedling mortality are texture of the surface layer, depth and duration of the water table, rock fragments in the surface layer, rooting depth, and the aspect of the slope. The mortality rate generally is highest on soils that have a sandy or clayey surface layer. The risk is *slight* if, after site preparation, expected mortality is less than 25 percent; *moderate* if expected mortality is between 25 and 50 percent; and *severe* if expected mortality exceeds 50 percent. Ratings of *moderate* or *severe* indicate that it may be necessary to plant containerized or larger than usual nursery stock or to make special site preparations, such as bedding, furrowing, installing a surface drainage system, or providing artificial shade for seedlings. Reinforcement planting is often needed if the risk is moderate or severe.

Ratings of *windthrow hazard* indicate the likelihood of trees being uprooted by the wind. A restricted rooting depth is the main reason for windthrow. The rooting depth can be restricted by a high water table, a fragipan, or bedrock or by a combination of such factors as soil wetness, texture, structure, and depth. The risk is *slight* if strong winds cause trees to break but do not uproot them; *moderate* if strong winds cause an occasional tree to be blown over and many trees to break; and *severe* if moderate or strong winds commonly blow trees over. Ratings of *moderate* or *severe* indicate the need for care in thinning or possibly not thinning at all. Specialized equipment may be needed to avoid damage to shallow root systems in partial cutting operations. A plan for the periodic removal of windthrown trees and the maintenance of a road and trail system may be needed.

Ratings of *plant competition* indicate the likelihood of the growth or invasion of undesirable plants. Plant competition is more severe on the more productive soils, on poorly drained soils, and on soils having a restricted root zone that holds moisture. A rating of *slight* indicates that competition from undesirable plants hinders adequate natural or artificial reforestation but does not necessitate intensive site preparation and maintenance. A rating of *moderate* indicates that competition from undesirable plants hinders natural or artificial reforestation so much that intensive site preparation and maintenance are needed. A rating of *severe* indicates that competition from undesirable plants prevents adequate natural or artificial reforestation unless the site is intensively prepared and maintained. A *moderate* or *severe* rating indicates the need for site preparation to ensure the development of an adequately stocked stand. Managers must plan site preparation measures to ensure reforestation without delays.

The potential productivity of *common trees* on a soil is expressed as a *site index* and a *productivity class*. Common trees are listed in the order of their observed general occurrence. Generally, only two or three species dominate.

The *site index* is determined by taking height measurements and determining the age of selected trees within stands of a given species. This index is the average height, in feet, that the trees attain in a specified number of years. This index applies to fully stocked, even-aged, unmanaged stands. Site index values given in table 4 are based on standard procedures and techniques *(13, 20, 21)*.

The *productivity class* represents an expected volume produced by the most important trees, expressed in cubic meters per hectare per year. Cubic meters per hectare can be converted to cubic feet per acre by multiplying by 14.3. It can be converted to board feet by multiplying by a factor of about 71. For example, a productivity class of 8 means the soil can be expected to produce about 114 cubic feet per acre per year at the point where the mean annual increment culminates, or about 568 board feet per acre per year.

Trees to plant are those that are used for reforestation or, under suitable conditions, for natural regeneration. They are suited to the soils and can produce a commercial wood crop. The desired product, the topographic position (such as a low, wet area), and personal preference are three factors among many that can influence the choice of trees for reforestation.

Rangeland and Grazeable Woodland

R. Gregory Hendricks, range conservationist, Soil Conservation Service, helped prepare this section.

Native forage can provide livestock producers an economical alternative to tame pasture forage, which requires a high degree of maintenance. Native forage grows on a variety of sites ranging from extremely droughty sandhills to marshlands. Typically, it is most productive in areas that are considered too wet for other uses unless a water-control system is installed. Native forage can be grown on about 206,000 acres in Sarasota County. About 151,000 acres is used primarily as rangeland, and 55,000 acres is used primarily as woodland *(3)*.

Many areas in Sarasota County support ecological plant communities that are of little value to the livestock industry. These plant communities are in areas where the soils are not assigned to range sites. They generally provide little forage for livestock. These plant communities are South Florida Coastal Strand, which is in areas of Canaveral soils; Cypress Swamp, in areas of Pompano soils; Mangrove Swamp, in areas of Kesson and Wulfert soils; and Swamp Hardwoods, in areas of Gator soils and the frequently flooded Astor, Delray, Felda, Pompano, and Floridana soils.

Some soils in Sarasota County are in neither a range site nor an ecological plant community. These include Floridana and Gator soils that are used entirely as cropland. They also include Matlacha and St. Augustine soils, which are in areas that have been dredged and filled.

Rangeland

The dominant native forage species that grow naturally on a soil are generally the most productive and the most suitable for livestock. They can be naturally maintained on the site as long as the environment does not change. These forage species are grouped into three categories, depending on their response to grazing. These categories are decreasers, increasers, and invaders.

Decreasers are generally the most abundant and most palatable plants on a given range site in good or excellent condition. They decrease in abundance in response to continuous heavy grazing. *Increasers* are less palatable to livestock than decreasers. They increase in abundance for a short time in response to continuous heavy grazing, but they too eventually decrease. *Invaders* are native to rangeland in small amounts. They have very little value as forage, so they tend to become the new dominant plants as the decreaser and increaser plants are depleted.

Range condition is determined by comparing the present plant community with the potential native plant community on a particular range site. The more closely the existing community resembles its potential, the better the range condition. The range is in *excellent* condition if it produces 76 to 100 percent of the potential native plant community, in *good* condition if it produces 51 to 75 percent of the potential, in *fair* condition if it produces 26 to 50 percent of the potential, and in *poor* condition if it produces 0 to 25 percent of the potential. About 90 percent of the rangeland in Florida is in poor or fair condition.

Table 5 shows for each soil that supports rangeland vegetation suitable for grazing the range site name and the annual forage production in favorable, average, and unfavorable years. Annual forage production refers to the amount of air-dry herbage, in pounds per acre per year, that can be expected to grow on well managed rangeland in good or excellent condition. In a favorable year, the amount and distribution of precipitation and the temperatures make growing conditions substantially better than average. In an unfavorable year, growing conditions are well below average.

The productivity of range sites is closely related to the natural drainage of the soil. The wettest soils, such as those in freshwater and saltwater marshes, produce the most vegetation, and deep, droughty soils on sandhills normally produce the least amount of annual forage. The potential productivity should be considered when the management of range sites is planned. Soils that have the highest production potential should be given the highest priority if economic considerations are important.

The major management considerations involve livestock grazing. The objective in range management is to control grazing so that the native plants growing on a site are about the same in kind and amount as the potential native composition for that site. Such management generally results in the optimum production of vegetation, conservation of water, and control of erosion. The length of time that a site should be grazed and rested, the season when it should be grazed and rested, the grazing pattern within a pasture that includes more than one soil, and the palatability of the dominant plants on the soil are basic considerations if rangeland is to be improved or maintained.

Range improvement measures, such as mechanical brush control, controlled burning, and controlled livestock grazing, are beneficial on the rangeland in Florida. Predicting the effects of these measures is of utmost importance. Proper range management results in maximum sustained forage production and conservation of soil and water resources. It also improves the habitat for many wildlife species.

Seven range sites in Sarasota County are important to the livestock industry. The most extensive of these are the South Florida Flatwoods and the Slough range sites. A brief description of the seven range sites follows.

South Florida Flatwoods.—This range site is on nearly level flatwoods. Scattered to numerous pine trees are common, and scattered saw palmetto, inkberry, and other woody plants grow throughout the site. The site produces an abundant quantity of grasses. Creeping bluestem is the dominant grass. The site also produces significant amounts of indiangrass, chalky bluestem, panicum, and pineland threeawn. As the site deteriorates because of uncontrolled livestock grazing and annual burning, the abundance of saw palmetto and pineland threeawn increases significantly. Because of their higher palatability, bluestem, panicum, and indiangrass decrease in abundance.

If this site is in excellent condition, the annual production ranges from about 6,000 pounds of air-dry herbage per acre in favorable years to 3,000 pounds per acre in unfavorable years. If the site is in excellent condition, the total annual production is about 75 percent grasses and grasslike plants, 10 percent forbs, and 15 percent woody plants and trees.

Slough.—This range site is on open grassland where nearly level areas act as broad natural drainageways on flatwoods. The potential plant community is dominated by blue maidencane, chalky bluestem, and toothachegrass. These grasses are all readily grazed by livestock. If overgrazing continues for prolonged periods, carpetgrass, pineland threeawn, and sedges replace the better grasses.

In areas that are in excellent condition, the annual production of air-dry herbage from all sources ranges from about 8,000 pounds per acre in favorable years to about 4,000 pounds per acre in unfavorable years. If the range condition is excellent, the total annual production is about 85 percent grasses and grasslike plants and 15 percent forbs and the site supports a few woody plants and trees.

Freshwater Marshes and Ponds.—This range site is in areas of open grassland marshes or ponds (fig. 10). It can produce significant amounts of maidencane and cutgrass. The water level fluctuates throughout the year. Livestock grazing is naturally deferred during periods of high water. This site is a preferred grazing area, but prolonged overgrazing causes deterioration of the plant community. Overgrazing results in an increase in the abundance of pickerelweed and in places an increase in the abundance of sawgrass. Prolonged overgrazing results in an increase in the abundance of buttonbush, willows, and waxmyrtle.

If in excellent condition, this range site can produce more than 10,000 pounds of air-dry herbage per acre in favorable years and 5,000 pounds per acre in unfavorable years. If the site is in excellent condition, the total annual production is about 80 percent grasses and grasslike plants, 15 percent forbs, and 5 percent woody plants and trees.

Wetland Hardwood Hammock.—This range site is in wooded areas where the soils are nearly level and are somewhat poorly drained or poorly drained. Laurel oak, live oak, water oak, cabbage palm, red maple, sweetgum, and cypress dominate the forest canopy. Because of the density of the canopy, the potential for forage production is low. Longleaf uniola, eastern gamagrass, switchgrass, chalky bluestem, maidencane, and blue maidencane are important forage species when the site is in excellent condition. When the site is in poor or fair condition, wiregrasses, dogfennel, and carpetgrass are common in the understory.

If the site is in excellent condition, the annual production of air-dry herbage from all sources ranges from about 3,500 pounds per acre in favorable years to 2,000 pounds per acre in unfavorable years. The average annual production is 2,500 pounds per acre. The total annual production is about 40 percent grasses and grasslike plants, 40 percent woody plants and trees, and 20 percent forbs.

Sand Pine Scrub.—This range site is on dunelike sand ridges. It has limited potential for the production of native forage plants. It supports a fairly dense stand of sand pine and a dense woody understory. Livestock do not graze on this site if other range sites are available. The principal forage plants are bluestems, indiangrass, and panicum. Numerous legumes and forbs grow in these areas.

In areas that are in excellent condition, the annual production of air-dry herbage from all sources ranges from about 3,500 pounds per acre in favorable years to about 1,500 pounds per acre in unfavorable years. If the range site is in excellent condition, the total annual production is about 40 percent grasses and grasslike plants, 20 percent forbs, and 40 percent woody plants and trees.

Longleaf Pine-Turkey Oak Hills.—This range site is in areas of nearly level to gently sloping, well drained to excessively drained, coarse textured soils. It has a moderately low potential for the production of important forage species. It can be easily recognized because it supports scattered longleaf pine and turkey oak. The important forage species include creeping bluestem, paintbrush bluestem, purple bluestem, and indiangrass. This site provides excellent winter shelter for cattle, escape cover for wildlife, and important habitat for many species of wildlife.

In areas that are in excellent condition, the annual production of air-dry herbage from all sources ranges from about 4,000 pounds per acre in favorable years to 2,000 pounds per acre in unfavorable years. The average annual production is 3,000 pounds per acre. The total annual production is about 60 percent grasses and grasslike plants, 20 percent forbs, and 20 percent woody plants and trees.

Cabbage Palm Flatwoods.—This range site is in

Figure 10.—An area of Holopaw fine sand, depressional, which is in the Freshwater Marshes and Ponds range site. The adjacent area of Pineda fine sand is used as improved pasture.

nearly level areas that support scattered cabbage palm and saw palmetto. It is a preferred livestock grazing area. It produces a high quantity of good-quality forage plants if it is in excellent condition. Creeping bluestem, chalky bluestem, South Florida bluestem, and several desirable panicum species are the dominant forage grasses. Pineland threeawn and saw palmetto increase in abundance as the site deteriorates.

If the range is in excellent condition, the annual production of air-dry herbage from all sources ranges from about 9,000 pounds per acre in favorable years to about 4,500 pounds per acre in unfavorable years. The total annual production is about 70 percent grasses and grasslike plants, 15 percent forbs, and 15 percent woody plants and trees.

Grazeable Woodland

Grazeable woodland has an understory of native grasses, legumes, and forbs. The understory is an integral part of the forest plant community. The native plants can be grazed without significantly impairing the other forest values. Grazing is compatible with timber management if it is controlled or managed in such a manner that both the timber and the forage resources are maintained or enhanced.

Understory vegetation consists of grasses, forbs, shrubs, and other plants within reach of livestock or of grazing or browsing wildlife. A well managed wooded area can produce enough understory vegetation to support optimum numbers of livestock, wildlife, or both. Forage production varies, depending on the kind of grazeable woodland; the amount of shade provided by the canopy; the accumulation of fallen needles; the influence of the time and intensity of grazing on the grass species; the number, size, and spacing of tree plantings; and the method of site preparation.

Recreation

In table 6, the soils in the county are rated according to the limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewer lines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation also are important. Soils subject to flooding are limited for recreational use by the duration and intensity of flooding and the season when flooding occurs. In planning recreation facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In table 6, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations, if any, are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

The information in table 6 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 9 and interpretations for dwellings without basements and for local roads and streets in table 8.

Camp areas require site preparation, such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils have gentle slopes and are not wet or subject to flooding during the period of use. The surface absorbs rainfall readily but remains firm and is not dusty when dry.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for picnic areas are firm when wet, are not dusty when dry, and are not subject to flooding during the period of use.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is firm after rains and is not dusty when dry. If grading is needed, the depth of the soil over bedrock or a hardpan should be considered.

Paths and trails for hiking and horseback riding should require little or no cutting and filling. The best soils are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once a year during the period of use.

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. The best soils for use as golf fairways are firm when wet, are not dusty when dry, and are not subject to prolonged flooding during the period of use. The suitability of the soil for tees or greens is not considered in rating the soils.

Wildlife Habitat

John F. Vance, Jr., biologist, Soil Conservation Service, helped prepare this section.

Sarasota County has extensive areas of good wildlife habitat, even though much of the highly desirable habitat in the coastal areas has been developed. The beaches, mangroves, and hardwood hammock areas are still under heavy pressure for development.

The primary game species are bobwhite quail and white-tailed deer (fig. 11). Some opportunities for hunting also are provided by wild turkey, squirrels, feral hogs, snipe, and waterfowl. The chief species of waterfowl are Florida duck in inland areas and teal, gadwall, pintail, ringneck, and scaup in the coastal areas. Nongame species include raccoon, opossum, skunk, armadillo, bobcat, gray fox, otter, owls, songbirds, wading birds, shore birds, woodpeckers, reptiles, and amphibians. Numerous fish species provide excellent opportunities for fishing in the brackish and saltwater areas. Largemouth bass and various sunfish are the primary species caught in areas of freshwater.

Most of the inland areas are used as large cattle ranches, but some are used for vegetable crops. These areas, especially those used as native range, provide wildlife habitat, but the habitat could be improved by modification of poor grazing and burning practices.

A number of endangered or threatened species inhabit the county, including the seldom-seen red-cockaded woodpecker and sandhill crane and more common species, such as alligator and pelican. A complete list of such species and detailed information regarding their range and habitat can be obtained from the local office of the Soil Conservation Service.

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants.

In table 7, the soils in the county are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or

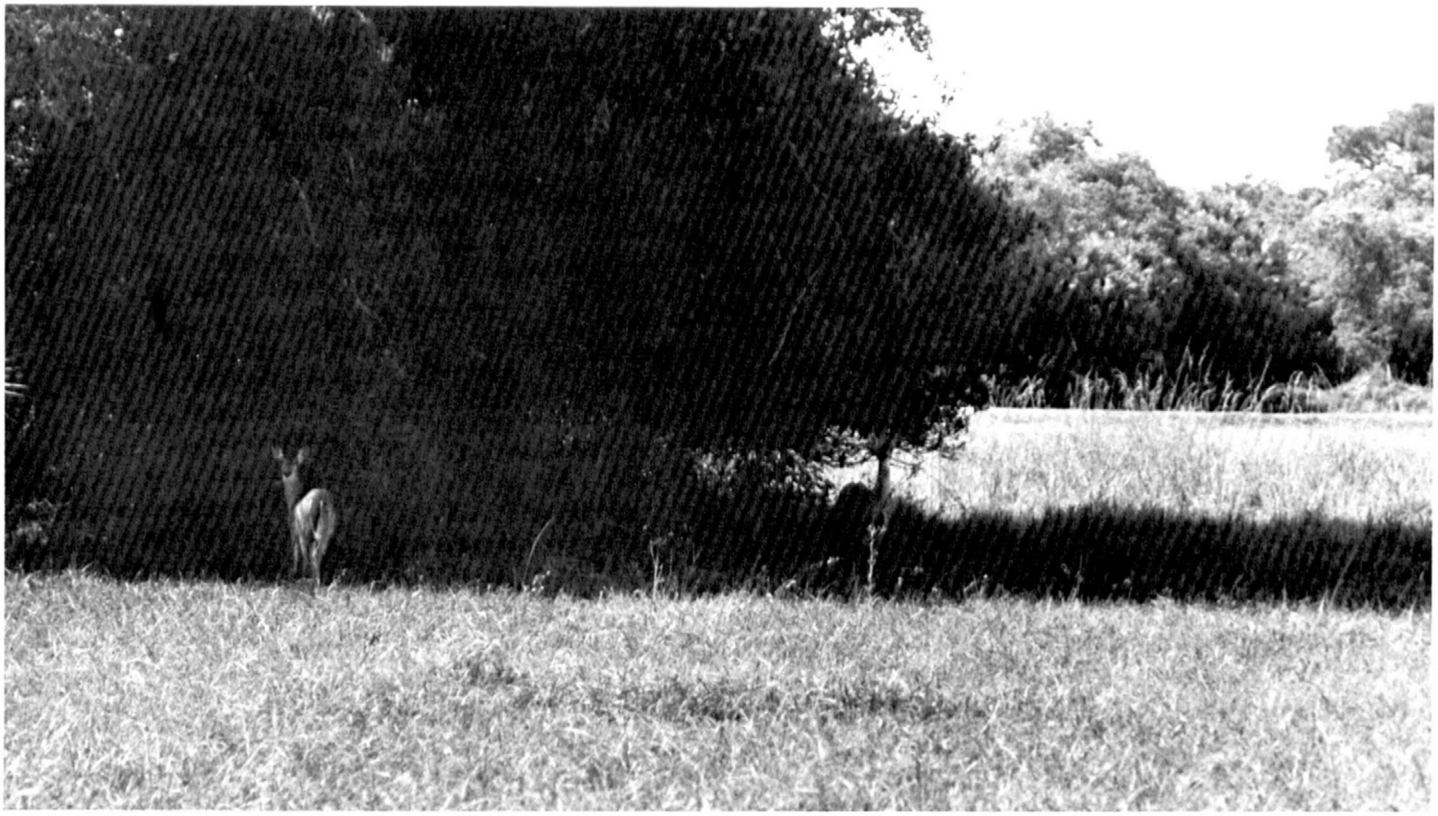


Figure 11.—An area of EauGallie, Myakka, and Pineda fine sands that provides habitat for white-tailed deer. The EauGallie and Myakka soils are in the pastured area in the foreground, and the Pineda soil is in the background.

very poor. A rating of *good* indicates that the element or kind of habitat is easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected. A rating of *fair* indicates that the element or kind of habitat can be established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* indicates that limitations are severe for the designated element or kind of habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* indicates that restrictions for the element or kind of habitat are very severe and that unsatisfactory results can be expected. Creating, improving, or maintaining habitat is impractical or impossible.

The elements of wildlife habitat are described in the following paragraphs.

Grain and seed crops are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flood hazard. Soil temperature and soil moisture also are considerations. Examples of grain and seed crops are corn, wheat, oats, millet, and grain sorghum.

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flood hazard, and slope. Soil temperature and soil moisture also are considerations. Examples of grasses and legumes are bahiagrass, cowpeas, clover, and sesbania.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flood hazard. Soil temperature and soil moisture also are considerations. Examples of wild herbaceous plants are bluestem, goldenrod, Florida beggarweed, partridge pea, and switchgrass.

Hardwood trees and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of hardwoods and shrubs are depth of the root zone, the available water capacity, and wetness. Examples of these plants are oak, wild grape, sweetgum, cabbage palm, hawthorn, dogwood, hickory, blackberry, and blueberry. Examples of fruit-producing shrubs that are suitable for planting on soils rated *good* are wild plum, firethorn, and waxmyrtle.

Coniferous plants furnish browse and seeds. Soil properties and features that affect the growth of coniferous trees, shrubs, and ground cover are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pine, cypress, and cedar.

Wetland plants are annual and perennial, wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, and slope. Examples of wetland plants are smartweed, wild millet, pickerelweed, saltgrass, cordgrass, rushes, sedges, reeds, and maidencane.

Shallow water areas have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas are the depth to bedrock, wetness, slope, and permeability. Examples of shallow water areas are marshes, waterfowl feeding areas, and ponds.

The habitat for various kinds of wildlife is described in the following paragraphs.

Habitat for openland wildlife consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. Wildlife attracted to these areas include bobwhite quail, dove, meadowlark, field sparrow, cottontail, red fox, armadillo, and sandhill crane.

Habitat for woodland wildlife consists of areas of deciduous plants or coniferous plants or both and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include wild turkey, thrushes, woodpeckers, owls, squirrels, gray fox, raccoon, deer, and bobcat.

Habitat for wetland wildlife consists of open, marshy or swampy shallow water areas. Some of the wildlife attracted to such areas are ducks, herons, shore birds, mink, beaver, egrets, and alligators.

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. The ratings are given in the following tables: Building site development, Sanitary facilities, Construction materials, and Water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil Properties" section.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

State and county ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. These ordinances and regulations must be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 or 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand fraction, and the kinds of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to evaluate the potential of areas for residential, commercial, industrial, and recreational uses; make preliminary estimates of construction conditions; evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; plan detailed onsite investigations of soils and geology; locate potential sources of gravel, sand, earthfill, and topsoil; plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey, can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

Building Site Development

Table 8 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations, if any, are minor and easily overcome; *moderate* if soil properties or site features are moderately favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or alteration.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to bedrock, soil texture, and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and depth to the water table.

Dwellings and *small commercial buildings* are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, shrink-swell potential, and organic layers can cause the movement of footings. A high water table, depth to bedrock, slope, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 or 6 feet are not considered.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material; a base of gravel, crushed rock, or stabilized soil material; and a flexible or rigid surface. Cuts and fills are generally limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. Depth to bedrock, a high water table, flooding, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), shrink-swell potential, and depth to a high water table affect the traffic-supporting capacity.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. The ratings are based on soil properties, site features, and observed performance of the soils. Soil reaction, a high water table, depth to bedrock, the available water capacity in the upper 40 inches, and the content of salts, sodium, and sulfidic materials affect plant growth. Flooding, wetness, slope, and the amount of sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established.

Sanitary Facilities

Table 9 shows the degree and the kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations, if any, are minor and easily overcome; *moderate* if soil properties or site features are moderately favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or alteration.

Table 9 also shows the suitability of the soils for use as daily cover for landfills. A rating of *good* indicates that soil properties and site features are favorable for the use and that good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or alteration.

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 72 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, a high water table, depth to bedrock, and flooding affect absorption of the effluent. Bedrock interferes with installation.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravel or fractured bedrock is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to filter the effluent effectively. Many local and state ordinances require that this material be of a certain thickness.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water.

Table 9 gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, a high water table, depth to bedrock, flooding, and the content of organic matter.

Excessive seepage resulting from rapid permeability in the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive or if floodwater overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope and bedrock can cause construction problems.

Sanitary landfills are areas where solid waste is disposed of by burying it in soil. There are two types of landfill—trench and area. In a trench landfill, the waste is placed in a trench. It is spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an area landfill, the waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground-water pollution. Ease of excavation and revegetation needs to be considered.

The ratings in table 9 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock or to a cemented pan, depth to the water table, slope, and flooding affect both types of landfill. Texture, highly organic layers, soil reaction, and content of salts affect trench type landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area type sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, wetness, coarse fragments, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy soils that are free of excess gravel are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to soil blowing.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock or the water table to permit revegetation. The soil material used as final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

Construction Materials

Table 10 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated as a *probable* or *improbable* source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by a high water table and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel or both. They have at least 5 feet of suitable material and a low shrink-swell potential. Depth to the water table is more than 3 feet. Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have a moderate shrink-swell potential. Depth to the water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10 or a high shrink-swell potential. They are wet, and the depth to the water table is less than 1 foot. These soils may have layers of suitable material, but the material is less than 3 feet thick.

Sand and gravel are natural aggregates suitable for commercial use with a minimum of processing. Sand and gravel are used in many kinds of construction. Specifications for each use vary widely. In table 10, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the engineering classification of the soil), the thickness of suitable material, and the content of rock fragments. Kinds of rock, acidity, and stratification are given in the soil series descriptions. Gradation of grain sizes is given in the table on engineering index properties.

A soil rated as a probable source has a layer of clean sand or gravel or a layer of sand or gravel that is as much as 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight, large stones. All other soils are rated as an improbable source. Coarse fragments of soft bedrock, such as shale and siltstone, are not considered to be sand and gravel.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area.

Plant growth is affected by toxic material and by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by rock fragments, slope, a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, a water table, rock fragments, and bedrock.

Soils rated *good* have friable loamy material to a depth of at least 40 inches. They have little or no gravel and have slopes of less than 8 percent. They are low in content of soluble salts, are naturally fertile or respond well to fertilizer, and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils, loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, or soils that have an appreciable amount of gravel or soluble salts. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of gravel or soluble salts, have slopes of more than 15 percent, or have a seasonal water table at or near the surface.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and releases a variety of plant nutrients as it decomposes.

Water Management

Table 11 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas; embankments, dikes, and levees; and aquifer-fed excavated ponds. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations, if any, are minor and are easily overcome; *moderate* if soil properties or site features are moderately favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are unfavorable for the use. Special design, possibly increased maintenance, or alteration are required.

This table also gives the restrictive features that affect each soil for drainage, irrigation, terraces and diversions, and grassed waterways.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability in the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or salts. A high water table affects the amount of usable material. It also affects trafficability.

Aquifer-fed excavated ponds are pits or dugouts that extend to a ground-water aquifer or to a depth below a permanent water table. Excluded are ponds that are fed only by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Excavated ponds are affected by depth to a permanent water table, permeability of the aquifer, and the salinity of the soil. Depth to bedrock affects the ease of excavation.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock, to a cemented pan, or to other layers that affect the rate of water movement; permeability; depth to a high water table or depth of standing water if the soil is subject to ponding; slope; susceptibility to flooding; and subsidence of organic layers. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock, large stones, slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity or by toxic substances in the root zone, such as salts, sodium, or sulfur. Availability of drainage outlets is not considered in the ratings.

Irrigation is the controlled application of water to supplement rainfall and support plant growth. The design and management of an irrigation system are affected by depth to the water table, the need for drainage, flooding, available water capacity, intake rate, permeability, erosion hazard, and slope. The construction of a system is affected by depth to bedrock. The performance of a system is affected by the depth of the root zone, the amount of salts, and soil reaction.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to control erosion and conserve moisture by intercepting runoff. Slope, wetness, and depth to bedrock or to a cemented pan affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of soil blowing or water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Wetness, slope, and depth to bedrock affect the construction of grassed waterways. A hazard of soil blowing, low available water capacity, restricted rooting depth, toxic substances such as salts or sodium, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features, listed in tables, are explained on the following pages.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classification, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

Engineering Index Properties

Table 12 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under "Soil Series and Their Morphology."

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is as much as 15 percent, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the Glossary.

Classification of the soils is determined according to the Unified soil classification system *(2)* and the system adopted by the American Association of State Highway and Transportation Officials *(1)*.

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, SP-SM.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

Rock fragments larger than 3 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

Physical and Chemical Properties

Table 13 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Clay as a soil separate, or component, consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated content of clay in each major soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They influence the soil's adsorption of cations, moisture retention, shrink-swell potential, permeability, plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at ⅓ bar moisture tension. Weight is determined after drying the soil at 105 degrees C. In this table, the estimated moist bulk density of each major soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. A bulk density of more than 1.6 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability refers to the ability of a soil to transmit water or air. The estimates indicate the rate of movement of water through the soil when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems, septic tank absorption fields, and construction where the rate of water movement under saturated conditions affects behavior.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage in each major soil layer is stated in inches of water per inch of soil. The capacity varies, depending on soil properties that affect the retention of water and the depth of the root zone. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Soil reaction is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH of each major horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Salinity is a measure of soluble salts in the soil at saturation. It is expressed as the electrical conductivity of the saturation extract, in millimhos per centimeter at 25 degrees C. Estimates are based on field and laboratory measurements at representative sites of nonirrigated soils. The salinity of irrigated soils is affected by the quality of the irrigation water and by the frequency of water application. Hence, the salinity of soils in individual fields can differ greatly from the value given in the table. Salinity affects the suitability of a soil for crop production, the stability of soil if used as construction material, and the potential of the soil to corrode metal and concrete.

Shrink-swell potential is the potential for volume change in a soil with a loss or gain in moisture. Volume change occurs mainly because of the interaction of clay minerals with water and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil moisture content influence the amount of swelling of soils in place. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others, swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on measurements of similar soils.

If the shrink-swell potential is rated moderate to very high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The change is based on the soil fraction less than 2 millimeters in diameter. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; and *high*, more than 6 percent. *Very high*, greater than 9 percent, is sometimes used.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet and rill erosion. Losses are expressed in tons per acre per year. These estimates are based primarily on percentage of silt, sand, and organic matter (up to 4 percent) and on soil structure and permeability. Values of K range from 0.02 to 0.69. The higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur over a sustained period without affecting crop productivity. The rate is expressed in tons per acre per year.

Wind erodibility groups are made up of soils that have similar properties affecting their resistance to soil blowing in cultivated areas. The groups indicate the susceptibility to soil blowing. Soils are grouped according to the following distinctions:

1. Coarse sands, sands, fine sands, and very fine sands. These soils are extremely erodible, and vegetation is difficult to reestablish after cultivation.

2. Loamy coarse sands, loamy sands, loamy fine sands, loamy very fine sands, and sapric soil material. These soils are very highly erodible. Crops can be grown if intensive measures to control soil blowing are used.

3. Coarse sandy loams, sandy loams, fine sandy loams, and very fine sandy loams. These soils are highly erodible. Crops can be grown if intensive measures to control soil blowing are used.

4L. Calcareous loams, silt loams, clay loams, and silty clay loams. These soils are erodible. Crops can be grown if intensive measures to control soil blowing are used.

4. Clays, silty clays, noncalcareous clay loams, and silty clay loams that are more than 35 percent clay. These soils are moderately erodible. Crops can be grown if measures to control soil blowing are used.

5. Noncalcareous loams and silt loams that are less than 20 percent clay and sandy clay loams, sandy clays, and hemic soil material. These soils are slightly erodible. Crops can be grown if measures to control soil blowing are used.

6. Noncalcareous loams and silt loams that are more than 20 percent clay and noncalcareous clay loams that are less than 35 percent clay. These soils are very slightly erodible. Crops can be grown if ordinary measures to control soil blowing are used.

7. Silts, noncalcareous silty clay loams that are less than 35 percent clay, and fibric soil material. These soils are very slightly erodible. Crops can be grown if ordinary measures to control soil blowing are used.

8. Soils that are not subject to soil blowing because of coarse fragments on the surface or because of surface wetness.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In table 13, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter in a soil can be maintained or increased by returning crop residue to the soil. Organic matter affects the available water capacity, infiltration rate, and tilth. It is a source of nitrogen and other nutrients for crops.

Soil and Water Features

Table 14 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils are assigned to one of four groups. They are grouped according to the infiltration of water when the soils are thoroughly wet and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to two hydrologic groups in table 14, the first letter is for drained areas and the second is for undrained areas. Onsite investigation is needed to determine the hydrologic group of the soil in a particular area.

Flooding, the temporary covering of the surface by flowing water, is caused by overflowing streams, by runoff from adjacent slopes, or by inflow from high tides. Shallow water standing or flowing for short periods after rainfall or snowmelt is not considered flooding. Standing water in swamps and marshes or in a closed depression is considered ponding.

Table 14 gives the frequency and duration of flooding and the time of year when flooding is most likely to occur.

Frequency, duration, and probable dates of occurrence are estimated. Frequency generally is expressed as *none, rare, occasional,* or *frequent*. *None* means that flooding is not probable. *Rare* means that flooding is unlikely but possible under unusual weather conditions (the chance of flooding is near 0 to 5 percent in any year). *Occasional* means that flooding occurs infrequently under normal weather conditions (the chance of flooding is 5 to 50 percent in any year). *Frequent* means that flooding occurs often under normal weather conditions (the chance of flooding is more than 50 percent in any year). Duration is expressed as *very brief* (less than 2 days), *brief* (2 to 7 days), *long* (7 days to 1 month), and *very long* (more than 1 month). The time of year that floods are most likely to occur is expressed in months. About two-thirds to three-fourths of all flooding occurs during the stated period.

The information on flooding is based on evidence in the soil profile, namely, thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and absence of distinctive horizons that are characteristic of soils that are not subject to flooding.

Also considered is local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The depth to a seasonal high water table applies to undrained soils. The estimates are based mainly on the evidence of a saturated zone, namely grayish colors or mottles in the soil. Indicated in table 14 are the depth to the seasonal high water table; the kind of water table, that is, *perched, artesian*, or *apparent;* and the months of the year that the water table commonly is highest. A water table that is seasonally high for less than 1 month is not indicated in table 14.

An *apparent* water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil. An *artesian* water table is under hydrostatic head, generally below an impermeable layer. When this layer is penetrated, the water level rises in an uncased borehole. A *perched* water table is water standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

Only saturated zones within a depth of about 6 feet are indicated. A plus sign preceding the range in depth indicates that the water table is above the surface of the soil. The first numeral in the range indicates how high the water table rises above the surface. The second numeral indicates the depth below the surface.

Depth to bedrock is given if bedrock is within a depth of 5 feet. The depth is based on many soil borings and on observations during soil mapping. The rock is specified as either soft or hard. If the rock is soft or fractured, excavations can be made with trenching machines, backhoes, or small rippers. If the rock is hard or massive, blasting or special equipment generally is needed for excavation.

Subsidence is the settlement of organic soils or of saturated mineral soils of very low density. Subsidence results from either desiccation and shrinkage or oxidation of organic material, or both, following drainage. Subsidence takes place gradually, usually over a period of several years. Table 14 shows the expected initial subsidence, which usually is a result of drainage, and total subsidence, which results from a combination of factors.

Not shown in the table is subsidence caused by an imposed surface load or by the withdrawal of ground water throughout an extensive area as a result of lowering the water table.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors creates a severely corrosive environment. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low*, *moderate*, or *high*, is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion also is expressed as *low*, *moderate*, or *high*. It is based on soil texture, acidity, and the amount of sulfates in the saturation extract.

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories *(19)*. Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or on laboratory measurements. Table 15 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Eleven soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Spodosol.

SUBORDER. Each order is divided into suborders, primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Aquod (*Aqu*, meaning water, plus *od*, from Spodosol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Haplaquods (*Hapl*, meaning minimal horizonation, plus *aquod*, the suborder of the Spodosols that has an aquic moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic Haplaquods.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Generally, the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineral content, temperature regime, depth of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is sandy, siliceous, hyperthermic Typic Haplaquods.

SERIES. The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. There can be some variation in the texture of the surface layer or of the substratum within a series.

Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. The descriptions are arranged in alphabetic order.

Characteristics of the soil and the material in which it formed are identified for each series. The soil is compared with similar soils and with nearby soils of other series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the *Soil Survey Manual (17)*. Many of the technical terms used in the descriptions are defined in *Soil Taxonomy (19)*. Unless otherwise stated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units of each soil series are described in the section "Detailed Soil Map Units."

Astor Series

The soils of the Astor series are sandy, siliceous, hyperthermic Cumulic Haplaquolls. They are very poorly drained soils that formed in thick beds of sandy marine sediments. These nearly level soils are on flood plains. The slope is dominantly less than 1 percent but in some areas is 2 percent.

Astor soils are associated with Bradenton, Delray, Felda, Floridana, Gator, Holopaw, and Pompano soils. Felda, Holopaw, and Pompano soils are in landscape positions similar to those of the Astor soils. They do not have a mollic epipedon. Bradenton soils are on slightly elevated ridges or hammocks adjacent to flood plains and depressions. They do not have a mollic epipedon. Gator soils are organic in the upper part. Delray and Floridana soils are in landscape positions similar to those of the Astor soils. They have a mollic epipedon that is less than 20 inches thick.

Typical pedon of Astor mucky fine sand, in an area of Delray and Astor soils, frequently flooded; on the flood plain along the Myakka River, about 2.2 miles north of the entrance to Myakka River State Park, along the entrance road, and 200 feet north of the road, NW¼NW¼NE¼ sec. 22, T. 37 S., R. 20 E.

A1—0 to 2 inches; black (10YR 2/1) mucky fine sand; weak fine granular structure; very friable; many fine roots; neutral; abrupt smooth boundary.

A2—2 to 22 inches; very dark gray (10YR 3/1) mucky fine sand; weak medium subangular blocky structure; very friable; many fine roots; neutral; clear smooth boundary.

A3—22 to 32 inches; very dark gray (10YR 3/1) fine sand; single grained; loose; many fine roots; neutral; clear smooth boundary.

Cg1—32 to 47 inches; grayish brown (10YR 5/2) loamy sand; weak fine subangular blocky structure; very friable, nonsticky and nonplastic; few fine roots; neutral; clear smooth boundary.

Cg2—47 to 54 inches; light brownish gray (10YR 6/2) loamy sand; weak fine subangular blocky structure; very friable, nonsticky and nonplastic; few fine roots; mildly alkaline; clear smooth boundary.

Cg3—54 to 80 inches; light brownish gray (10YR 6/2) fine sand; single grained; loose; few fine faint brownish yellow mottles; mildly alkaline.

Reaction ranges from slightly acid to moderately alkaline throughout the profile.

The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2. It is sand, fine sand, or mucky fine sand. It is 24 to 50 inches thick.

The C horizon has hue of 10YR to 5Y, value of 3 to 6, and chroma of 1 or 2. In some pedons it has mottles in shades of gray or yellow. It is dominantly sand, fine sand, or loamy sand. In some pedons, however, it has thin, discontinuous strata of loamy fine sand. Shell fragments of sand size are in the lower part of the C horizon in some pedons.

Boca Series

The soils of the Boca series are loamy, siliceous, hyperthermic Arenic Ochraqualfs. They are poorly drained soils that formed in moderately thick beds of sandy and loamy marine sediments. They are underlain by a hard, limestone ledge that has numerous fractures and solution holes. These nearly level soils are mostly on flatwoods. The slope ranges from 0 to 2 percent.

Boca soils are associated with Felda, Hallandale, Myakka, Pineda, Pompano, and Wabasso soils. Of these associated soils, only the Hallandale soils are underlain by limestone bedrock. They have limestone bedrock within a depth of 20 inches and do not have an argillic horizon.

Typical pedon of Boca fine sand, in an area of Boca and Hallandale soils; about 2,500 feet west of River Road and 400 feet south of U.S. Highway 41, NW¼NE¼SE¼ sec. 33, T. 39 S., R. 20 E.

Ap—0 to 4 inches; black (10YR 2/1) fine sand; single grained; loose; common fine roots; strongly acid; clear smooth boundary.

E—4 to 18 inches; light gray (10YR 6/1) fine sand; single grained; loose; strongly acid; clear smooth boundary.

EB—18 to 22 inches; light yellowish brown (10YR 6/3) fine sand; single grained; loose; medium acid; abrupt smooth boundary.

Bt—22 to 25 inches; mottled light gray (10YR 6/1) and yellowish brown (10YR 5/6, 5/4) fine sandy loam; weak fine subangular blocky structure; very friable, slightly sticky and nonplastic; moderately alkaline; abrupt irregular boundary.

Ck—25 to 32 inches; very pale brown (10YR 7/3) loamy fine sand; massive; friable, nonsticky and nonplastic; common fine distinct brownish yellow (10YR 6/8) mottles; about 10 percent sand-sized white shell fragments; moderately alkaline; abrupt smooth boundary.

R—32 inches; fractured, hard limestone bedrock.

The thickness of the solum and the depth to limestone generally range from 22 to 40 inches. In solution holes and fractures, however, the depth to limestone ranges from 22 to more than 50 inches. Depth to the argillic horizon ranges from 20 to 36 inches in more than half of the pedons.

Reaction ranges from strongly acid to moderately alkaline in the A, E, and EB horizons and from slightly acid to moderately alkaline in the Bt horizon.

The A or Ap horizon has hue of 10YR, value of 3 or 4, and chroma of 1. It is 6 to 9 inches thick. The E horizon has hue of 10YR, value of 5 or 6, and chroma of 2 or 3. It is 7 to 15 inches thick. The EB horizon has hue of 10YR, value of 4, and chroma of 3. It is 0 to 15 inches thick. The A, Ap, E, and EB horizons are sand or fine sand.

The Bt horizon has hue of 10YR, value of 5, and chroma of 1 to 3 or has hue of 2.5Y, value of 6, and chroma of 2. It is sandy loam, fine sandy loam, or sandy clay loam. It is 3 to 12 inches thick.

The Ck horizon, if it occurs, has colors and textures similar to those of the E horizon. It has more than 10 percent calcium carbonate and as much as 10 percent, by volume, shell fragments 2 to 20 millimeters in size.

The layer of hard limestone has many fractures and solution holes. The bedrock is 6 to 18 inches thick. The upper surface of the bedrock is smooth, and the lower surface is quite irregular. Layers of sand to sandy loam are below the bedrock. Some of these layers have a varying amount of shell fragments.

Bradenton Series

The soils of the Bradenton series are coarse-loamy, siliceous, hyperthermic Typic Ochraqualfs. They are poorly drained soils that formed in beds of sandy and loamy marine sediments. These nearly level soils are on low hammocks; in poorly defined drainageways; on broad, low flats; and on flood plains. The slope ranges from 0 to 2 percent.

Bradenton soils are associated with Delray, EauGallie, Manatee, Pineda, and Wabasso soils. EauGallie and Wabasso soils have a spodic horizon. Pineda soils have a Bw horizon. Delray and Manatee soils have a mollic epipedon. They are very poorly drained.

Typical pedon of Bradenton fine sand, frequently flooded; on a flood plain about 100 feet south of Myakka State Park Road and about 800 feet east of Myakka River bridge, NW¼NE¼SE¼ sec. 21, T. 37 S., R. 20 E.

A—0 to 5 inches; very dark gray (10YR 3/1) fine sand; single grained; loose; few medium and many fine roots; slightly acid; clear wavy boundary.

E—5 to 18 inches; light gray (10YR 7/2) fine sand; single grained; loose; few medium and fine roots; slightly acid; gradual smooth boundary.

Btg1—18 to 34 inches; gray (10YR 5/1) sandy loam; few coarse prominent yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; friable, slightly sticky; sand grains coated and bridged with clay; neutral; clear wavy boundary.

Btg2—34 to 62 inches; gray (10YR 6/1) sandy loam; common medium prominent yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; slightly sticky; sand grains coated and bridged with clay; moderately alkaline; clear smooth boundary.

Cg—62 to 80 inches; gray (5Y 5/1) loamy sand; few medium pockets of light brownish gray (10YR 6/2) fine sand; weak fine subangular blocky structure; very friable, slightly sticky; moderately alkaline.

The thickness of the solum ranges from 40 to 80 inches. The combined thickness of the A and E horizons is less than 20 inches. Reaction is slightly acid or neutral in the A horizon and ranges from slightly acid to moderately alkaline in all of the other horizons.

The A or Ap horizon has hue of 10YR, value of 2 to 4, and chroma of 1 or 2. It is 3 to 9 inches thick. It is sand or fine sand. The E horizon also is sand or fine sand. It has hue of 10YR, value of 5 to 7, and chroma of 1 or 2.

The Btg horizon has hue of 10YR, value of 3 to 7, and chroma of 1 or 2 or has hue of 5Y, value of 5, and chroma of 1. In some pedons it has yellowish brown, light olive brown, or dark grayish brown mottles. It is sandy loam, fine sandy loam, or sandy clay loam. In some pedons it has small fragments or nodules of iron-cemented sandstone or calcareous material. It is 4 to 12 inches thick.

Some pedons have a BCg horizon. This horizon has hue of 5GY, value of 5, and chroma of 1. It is loamy sand or sandy loam. It is 0 to 9 inches thick.

The Cg horizon has hue of 5Y or 5GY, value of 5 or 6, and chroma of 1 or has hue of 10YR, value of 6 or 7, and chroma of 1. It ranges from loamy fine sand to a mixture of sand and shell fragments or a mixture of loamy sand, shell fragments, and calcium carbonate nodules.

Canaveral Series

The soils of the Canaveral series are hyperthermic, uncoated Aquic Quartzipsamments. They are somewhat poorly drained or moderately well drained soils that formed in thick deposits of sand and fine shell fragments. These nearly level to gently sloping soils are on low, dunelike ridges and on side slopes bordering sloughs and mangrove swamps. The slope ranges from 0 to 5 percent.

Canaveral soils are associated with Kesson, Orsino, Pompano, St. Augustine, and Wulfert soils. Kesson and Wulfert soils are very poorly drained and are in tidal areas. Pompano soils are poorly drained and are in sloughs. Orsino soils are moderately well drained. They have Bw and Bh horizons. St. Augustine soils formed in mixed sandy, loamy, and silty material in areas that have been dredged and filled.

Typical pedon of Canaveral fine sand, 0 to 5 percent slopes; on Casey Key, about 1,700 feet north of the intersection of Casey Key Road and State Road 789, SE¼SE¼SE¼ sec. 9, T. 38 S., R. 18 E.

A—0 to 7 inches; dark gray (10YR 4/1) fine sand, grading to gray (10YR 5/1) in the lower part; single grained; loose; common fine to coarse roots; about 10 percent sand-sized shell fragments; mildly alkaline; strongly effervescent; clear wavy boundary.

C1—7 to 16 inches; light gray (10YR 7/1) fine sand; single grained; loose; about 10 percent sand-sized shell fragments; common fine and medium and few coarse roots; mildly alkaline; gradual wavy boundary.

C2—16 to 20 inches; light yellowish brown (10YR 6/4) fine sand; single grained; loose; common medium roots; about 30 percent multicolored sand-sized shell fragments; neutral; strongly effervescent; gradual smooth boundary.

C3—20 to 42 inches; light gray (10YR 7/2) fine sand; single grained; loose; few fine and medium roots; about 5 percent multicolored sand-sized shell fragments; mildly alkaline; strongly effervescent; clear wavy boundary.

C4—42 to 60 inches; pale brown (10YR 6/3) fine sand; common medium prominent light yellowish brown (10YR 6/4) mottles; single grained; loose; about 15 percent multicolored sand-sized shell fragments; a few shell fragments as much as 1 inch in diameter; mildly alkaline; strongly effervescent; clear wavy boundary.

C5—60 to 90 inches; light brownish gray (10YR 6/2) fine sand; few fine prominent light yellowish brown (10YR 6/4) mottles; single grained; loose; about 40 percent multicolored sand-sized shell fragments; mildly alkaline; strongly effervescent.

Reaction ranges from neutral to moderately alkaline to a depth of 80 inches or more. Because of the shell fragments, these soils are strongly effervescent. All horizons are sand or fine sand mixed with varying amounts of sand-sized shell fragments.

The A horizon has hue of 10YR, value of 2 to 4, and chroma of 1 or 2. It is 4 to 8 inches thick. The content of shell fragments in this horizon ranges from 5 to 10 percent.

The C horizon has hue of 10YR, value of 4 to 7, and chroma of 1 to 4 or has hue of 2.5Y, value of 6, and chroma of 2. It is a mixture of fine sand or sand and multicolored shell fragments. In some pedons it is stratified sand and shell fragments. The content of shell fragments ranges from 5 to 60 percent.

Cassia Series

The soils of the Cassia series are sandy, siliceous, hyperthermic Typic Haplohumods. They are somewhat poorly drained soils that formed in thick beds of sandy marine sediments. These nearly level soils are on coastal ridges and on slightly elevated knolls on flatwoods. The slope ranges from 0 to 2 percent.

Cassia soils are associated with EauGallie, Myakka, Orsino, and Pomello soils. EauGallie and Myakka soils are poorly drained. Orsino soils have a weakly expressed Bh horizon. Pomello soils have a spodic horizon within a depth of 50 inches. They are moderately well drained.

Typical pedon of Cassia fine sand; in the Old Myakka area, about 1,700 feet north of the intersection of State Highway 780 and Wilson Road and about 1,200 feet east of State Highway 780, SE¼NW¼SW¼ sec. 25, T. 36 S., R. 20 E.

A—0 to 4 inches; dark gray (10YR 4/1) fine sand; single grained; loose; many fine and very fine roots; strongly acid; clear smooth boundary.

E—4 to 24 inches; white (10YR 8/1) fine sand; single grained; loose; many fine and medium and few coarse roots that decrease in number with increasing depth; medium acid; abrupt wavy boundary.

Bh—24 to 34 inches; dark reddish brown (5YR 3/2) fine sand; weak fine granular structure; very friable; strongly acid; weakly cemented in about 20 percent of the horizon; clear smooth boundary.

BC—34 to 45 inches; dark brown (7.5YR 4/4) fine sand; single grained; loose; medium acid; clear smooth boundary.

C1—45 to 65 inches; pale brown (10YR 6/3) fine sand; single grained; loose; medium acid; gradual smooth boundary.

C2—65 to 80 inches; light gray (10YR 7/2) fine sand; single grained; loose; medium acid.

The solum is more than 40 inches thick. Depth to the spodic horizon is less than 30 inches.

The texture is sand or fine sand throughout the profile. Reaction ranges from extremely acid to medium acid throughout the profile.

The A horizon has hue of 10YR, value of 3 to 5, and chroma of 1. It is 1 to 6 inches thick. The E horizon has hue of 10YR, value of 6 to 8, and chroma of 1. It has darker stains and streaks in old root channels. The combined thickness of the A and E horizons is less than 30 inches.

The Bh horizon has hue of 10YR, value of 2, and chroma of 1 or 2 or has hue of 5YR, value of 3, and chroma of 2 or 3. Cementation varies in most pedons, but less than half of the horizon in each pedon is weakly cemented to strongly cemented. In some pedons, this horizon has pockets of material from the E horizon.

In some pedons a transitional layer is between the Bh and C horizons. This layer has hue of 10YR, value of 3 or 4, and chroma of 1 or 2. The C horizon has hue of 10YR, value of 5 to 7, and chroma of 2 to 4. It is sand or fine sand.

Delray Series

The soils of the Delray series are loamy, siliceous, hyperthermic Grossarenic Argiaquolls. They are very poorly drained soils that formed in thick beds of sandy and loamy marine sediments. These nearly level soils are in depressions and in poorly defined drainageways. The slope is less than 2 percent.

Delray soils are associated with Astor, Felda, Floridana, Pompano, and Wabasso soils. Felda, Pompano, and Wabasso soils do not have a mollic epipedon. Astor and Pompano soils are sandy to a depth of 80 inches or more. The sandy A and E horizons in Floridana soils have a combined thickness of 20 to 40 inches. Astor, Floridana, and Pompano soils are in landscape positions similar to those of the Delray soils. Felda and Wabasso soils are on flatwoods.

Typical pedon of Delray fine sand, depressional; about 2.3 miles west of the De Soto County line, along State Highway 72, and 50 feet north of the highway, SW¼SE¼SE¼ sec. 3, T. 38 S., R. 22 E.

A—0 to 30 inches; black (10YR 2/1) fine sand; few coarse distinct grayish brown (10YR 5/2) streaks and splotches; weak medium granular structure; friable; common fine roots; slightly acid; gradual wavy boundary.

Eg—30 to 54 inches; grayish brown (10YR 5/2) sand; single grained; loose; slightly acid; clear wavy boundary.

Btg—54 to 80 inches; olive gray (5Y 5/2) sandy loam; few medium distinct light yellowish brown (2.5Y 6/4) and light olive brown (2.5Y 5/6) mottles; weak medium subangular blocky structure; slightly sticky and nonplastic; few fine roots; neutral.

The solum is more than 50 inches thick. Reaction is medium acid or slightly acid in the A and E horizons and slightly acid to mildly alkaline in the Btg horizon and in the Cg horizon, if it occurs.

The A or Ap horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2, or it is neutral in hue and has value of 2. It can have few medium very dark gray, dark gray, or grayish brown splotches or pockets of sand. It is sand, fine sand, mucky loamy fine sand, or mucky fine sand. The content of organic matter in this horizon ranges from about 2 to 16 percent. The horizon is 14 to 20 inches thick.

The Eg horizon has hue of 10YR, value of 4 to 6, and chroma of 2. It can have very dark gray or dark gray splotches or thin streaks along root channels. It is sand or fine sand. It is 20 to 39 inches thick.

The Btg horizon has hue of 5GY or 5Y, value of 5 or 6, and chroma of 2 or has hue of 10YR, value of 4, and chroma of 2. It can have mottles in shades of gray, yellow, or brown. It is sandy loam, fine sandy loam, or sandy clay loam. It is 7 to 28 inches thick.

Some pedons have a Cg horizon. This horizon has hue of 5Y or 5GY, value of 5 or 6, and chroma of 1. It has pockets of marl or shell and calcium carbonate fragments. It is fine sandy loam or loamy fine sand.

EauGallie Series

The soils of the EauGallie series are sandy, siliceous, hyperthermic Alfic Haplaquods. They are poorly drained soils that formed in thick beds of sandy and loamy marine sediments. These nearly level soils are on broad flatwoods. The slope ranges from 0 to 2 percent.

EauGallie soils are associated with Myakka and Wabasso soils. Myakka soils do not have an argillic horizon. Wabasso soils are shallower to a Bt horizon than the EauGallie soils.

Typical pedon of EauGallie fine sand, in an area of EauGallie and Myakka fine sands; about 9.8 miles west of the De Soto County line, on State Highway 72, about 2,500 feet south of the highway, NW¼SE¼NE¼ sec. 9, T. 38 S., R. 21 E.

Ap—0 to 6 inches; black (10YR 2/1) fine sand; weak fine granular structure; very friable; very strongly acid; clear wavy boundary.

E—6 to 22 inches; gray (10YR 6/1) fine sand; single grained; loose; very strongly acid; abrupt wavy boundary.

Bh1—22 to 30 inches; black (10YR 2/1) fine sand; moderate fine subangular blocky structure; friable; very strongly acid; clear smooth boundary.

Bh2—30 to 44 inches; very dark gray (10YR 3/1) fine sand; weak fine subangular blocky structure; friable; very strongly acid; clear smooth boundary.

E′—44 to 48 inches; light gray (10YR 7/2) fine sand;

single grained; loose; strongly acid; abrupt wavy boundary.

Btg—48 to 66 inches; grayish brown (2.5Y 5/2) sandy loam; few medium distinct dark brown (7.5YR 4/4) streaks and common medium brown (10YR 5/3) mottles; weak medium subangular blocky structure; slightly sticky and slightly plastic; medium acid; clear wavy boundary.

Cg—66 to 80 inches; light brownish gray (10YR 6/2) loamy fine sand; single grained; loose; medium acid.

The solum is more than 50 inches thick. Depth to the spodic horizon ranges from 15 to 30 inches. Depth to the argillic horizon ranges from 40 to 80 inches. The A, E, and Bh horizons are sand or fine sand.

After rubbing, the A horizon has hue of 10YR, value of 2 to 4, and chroma of 1. Where value is less than 3.5, this horizon is less than 10 inches thick. Unrubbed colors may have a salt-and-pepper appearance. The E horizon has hue of 10YR, value of 5 to 7, and chroma of 1 or 2. The combined thickness of the A and E horizons is less than 30 inches. Reaction ranges from very strongly acid to moderately alkaline in areas where the surface layer has been limed.

The Bh horizon has hue of 5YR, value of 2 or 3, and chroma of 1 or 2 or has hue of 10YR, value of 2 or 3, and chroma of 1 to 3. The sand grains in this horizon are well coated with organic matter. The horizon is 3 to 36 inches thick. It ranges from very strongly acid to slightly acid. Some pedons have a BE horizon. This horizon has hue of 10YR, value of 4 or 5, and chroma of 3. It is 0 to 17 inches thick. It is fine sand. The E′ horizon, if it occurs, has hue of 10YR, value of 5 or 6, and chroma of 2. It is sand or fine sand. It is 0 to 11 inches thick.

The Btg horizon has hue of 10YR, value of 5 or 6, and chroma of 3; hue of 10YR, value of 5, and chroma of 2; hue of 2.5Y, value of 5, and chroma of 2; hue of 5Y, value of 5 or 6, and chroma of 1; or hue of 5Y, value of 5, and chroma of 2. Few or common fine or medium brown, yellowish brown, or brownish yellow mottles can be throughout this horizon. The horizon is sandy loam or sandy clay loam. It is about 6 to 20 inches thick. It ranges from strongly acid to slightly acid.

The Cg horizon has hue of 10YR to 5Y, value of 6, and chroma of 1 or 2. It is sand or loamy fine sand. In some pedons it has as much as 16 percent light gray shell fragments about 1 centimeter in size. It ranges from medium acid to mildly alkaline.

Felda Series

The soils of the Felda series are loamy, siliceous, hyperthermic Arenic Ochraqualfs. They are poorly drained or very poorly drained soils that formed in beds of sandy and loamy marine sediments. These nearly level soils are on low hammocks or flood plains; on broad, low flats; and in depressions. The slope ranges from 0 to 2 percent.

Felda soils are associated with Bradenton, Floridana, Holopaw, Pineda, and Wabasso soils. Wabasso soils have a spodic horizon. Pineda soils have a Bw horizon. Floridana soils have a mollic epipedon. They are very poorly drained. Holopaw soils have an argillic horizon at a depth of more than 40 inches. Bradenton soils have an argillic horizon within a depth of 20 inches.

Typical pedon of Felda fine sand, depressional; about 2.75 miles south of the Manatee County line and about 1.3 miles north of State Highway 780, NW¼SE¼SW¼ sec. 11, T. 36 S., R. 20 E.

A—0 to 3 inches; very dark grayish brown (10YR 3/2) fine sand; single grained; loose; few medium and many fine roots; slightly acid; clear wavy boundary.

Eg1—3 to 8 inches; gray (10YR 5/1) fine sand; single grained; loose; few medium and fine roots; slightly acid; gradual smooth boundary.

Eg2—8 to 22 inches; light brownish gray (10YR 6/2) fine sand; single grained; loose; few medium roots; slightly acid; abrupt irregular boundary.

Btg1—22 to 45 inches; gray (5Y 5/1) sandy loam; few coarse prominent yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; friable, slightly sticky; sand grains coated and bridged with clay; slightly acid; clear wavy boundary.

Btg2—45 to 60 inches; gray (5Y 6/1) sandy loam; common medium prominent yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; slightly sticky; sand grains coated and bridged with clay; slightly acid; gradual wavy boundary.

Cg—60 to 80 inches; gray (5Y 5/1) loamy sand; few medium pockets of light brownish gray (10YR 6/2) fine sand; weak fine subangular blocky structure; very friable, slightly sticky; neutral.

The thickness of the solum ranges from 40 to 80 inches. The combined thickness of the A and E horizons is 20 to 40 inches. Reaction is slightly acid or neutral in the A or Ap horizon and ranges from slightly acid to mildly alkaline in all of the other horizons.

The A or Ap horizon has hue of 10YR, value of 2 to 4, and chroma of 1 or 2. It is 3 to 9 inches thick. It is sand or fine sand. The E horizon also is sand or fine sand. It has hue of 10YR, value of 6 or 7, and chroma of 1 or 2 or has hue of 10YR, value of 5, and chroma of 1. It is 15 to 29 inches thick.

The Btg horizon has hue of 10YR to 5Y, value of 4 to 7, and chroma of 1 or 2, or it is neutral in hue and has value of 4 to 7. It is sandy loam, fine sandy loam, or sandy clay loam.

The Cg horizon has hue of 10YR to 5G, value of 4 to 8, and chroma of 1 or 2. It is sand, fine sand, or loamy sand. The content of shell fragments ranges from none to many.

Floridana Series

The soils of the Floridana series are loamy, siliceous, hyperthermic Arenic Argiaquolls. They are very poorly drained soils that formed in thick beds of sandy and loamy marine sediments. These nearly level soils are in depressions; in poorly defined drainageways; and on broad, low flats. The slope is less than 2 percent.

Floridana soils are associated with Delray, Gator, and Manatee soils. All of the associated soils are in landscape positions similar to those of the Floridana soils. Delray soils have an argillic horizon at a depth of 40 to 80 inches. Manatee soils have an argillic horizon within a depth of 20 inches. Gator soils are organic in the upper part.

Typical pedon of Floridana mucky fine sand, in an area of Floridana and Gator soils, depressional; about 1,500 feet south of the Manatee County line and about 4 miles east of Interstate 75, SW¼NW¼NE¼ sec. 3, T. 36 S., R. 19 E.

A1—0 to 5 inches; black (10YR 2/1) mucky fine sand, very dark grayish brown (10YR 3/2) dry; moderate medium granular structure; friable; few very fine and common fine and medium roots; neutral; gradual wavy boundary.

A2—5 to 14 inches; black (10YR 2/1) fine sand, very dark grayish brown (10YR 3/2) dry; weak fine granular structure; very friable; few very fine and common fine and medium roots; neutral; clear wavy boundary.

Eg1—14 to 22 inches; gray (10YR 6/1) fine sand; single grained; loose; common fine and few medium roots; slightly acid; abrupt wavy boundary.

Eg2—22 to 36 inches; light gray (10YR 7/1) fine sand; single grained; loose; few fine and medium roots; medium acid; clear wavy boundary.

Btg—36 to 52 inches; grayish brown (10YR 6/2) sandy clay loam; common fine and medium distinct yellowish brown (10YR 5/8) mottles; weak fine subangular blocky structure; slightly sticky and slightly plastic; few fine and medium pockets and streaks of black (N 2/0) material along old root channels; slightly acid; gradual irregular boundary.

Cg—52 to 80 inches; grayish brown (10YR 5/2) sandy loam; many fine and medium distinct yellowish brown (10YR 5/6) mottles; weak fine subangular blocky structure; many fine and medium white (10YR 8/1) pockets of soft calcium carbonate; strongly effervescent; mildly alkaline.

The solum is more than 35 inches thick. Reaction ranges from very strongly acid to moderately alkaline throughout the profile.

The A or Ap horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2, or it is neutral in hue and has value of 2. It is sand, fine sand, or mucky fine sand. It is 12 to 21 inches thick. The E horizon has hue of 10YR, value of 4 to 7, and chroma of 1 or 2. It is sand or fine sand. It is 6 to 10 inches thick.

The Btg horizon has hue of 10YR, value of 4 or 5, and chroma of 1 or 2 or has hue of 5Y, value of 5, and chroma of 1 or 2. In some pedons it has pockets of loamy fine sand, calcium carbonate fragments, and nodules 1 to 4 millimeters in size. It is 10 to 20 inches thick. Some pedons have a BCg horizon. This horizon has hue of 10YR to 5Y, value of 4 to 6, and chroma of 1 or 2. In some pedons it has pockets of loamy fine sand, calcium carbonate fragments, nodules 1 to 3 millimeters in size, or accumulations of soft, marly material. It is 3 to 28 inches thick. In some pedons the Btg and BCg horizons have gray, yellow, or brown mottles. These horizons are sandy loam, fine sandy loam, or sandy clay loam.

The Cg horizon has hue of 10YR, 5Y, or 5GY, value of 4 to 6, and chroma of 1. It is loamy sand, sandy loam, or sandy clay loam. In some pedons it has pockets of marl or shell and calcium carbonate fragments.

Ft. Green Series

The soils of the Ft. Green series are loamy, siliceous, hyperthermic Arenic Ochraqualfs. They are poorly drained soils that formed in thick beds of sandy and loamy marine sediments. These nearly level soils are on broad flatwoods. The slope ranges from 0 to 2 percent.

Ft. Green soils are associated with EauGallie, Felda, and Holopaw soils. All of the associated soils are in landscape positions similar to those of the Ft. Green soils. EauGallie soils have a spodic horizon. Felda soils do not have iron-cemented sandstone cobbles in the subsurface layer or subsoil. The sandy A and E horizons in Holopaw soils have a combined thickness of more than 40 inches.

Typical pedon of Ft. Green fine sand; about 2 miles south of the Manatee County line and 1.5 miles north of

State Highway 780, SE¼SE¼SE¼ sec. 11, T. 36 S., R. 20 E.

A—0 to 3 inches; dark gray (10YR 4/1) fine sand; single grained; loose, nonsticky and nonplastic; slightly acid; clear wavy boundary.

E1—3 to 18 inches; light brownish gray (10YR 6/2) fine sand; single grained; loose, nonsticky and nonplastic; slightly acid; gradual wavy boundary.

E2—18 to 26 inches; grayish brown (10YR 5/2) fine sand; single grained; loose, nonsticky and nonplastic; slightly acid; abrupt wavy boundary.

Btg1—26 to 38 inches; gray (10YR 6/1) cobbly sandy loam; weak medium subangular blocky structure; friable, slightly sticky and nonplastic; about 15 percent iron-cemented sandstone cobbles; neutral; gradual wavy boundary.

Btg2—38 to 44 inches; gray (10YR 6/1) sandy clay loam; moderate medium subangular blocky structure; friable, slightly sticky and slightly plastic; neutral; gradual wavy boundary.

Btg3—44 to 48 inches; light gray (10YR 7/1) sandy clay loam; moderate medium subangular blocky structure; friable, slightly sticky and slightly plastic; neutral; gradual wavy boundary.

BCg—48 to 80 inches; light gray (10YR 7/1) sandy loam; weak medium granular structure; friable, nonsticky and nonplastic; neutral.

Reaction ranges from strongly acid to neutral in the A and E horizons and from medium acid to moderately alkaline in the Btg and BCg horizons. The solum is 60 to more than 80 inches thick.

The A horizon has hue of 10YR, value of 2 to 5, and chroma of 1 or 2. It is 2 to 8 inches thick. The E horizon has hue of 10YR, value of 4 to 7, and chroma of 1 or 2. It is fine sand or sand. The combined thickness of the A and E horizons is 20 to 40 inches.

The Btg horizon has hue of 10YR to 5Y, value of 5 to 7, and chroma of 1 or 2. In some pedons it has mottles in shades of brown or yellow. It is cobbly fine sandy loam, cobbly sandy loam, or cobbly sandy clay loam in the upper part and sandy loam, fine sandy loam, or sandy clay loam in the lower part. The content of cobbles ranges from 15 to 25 percent in at least one Btg subhorizon.

The BCg horizon has hue of 10YR to 5Y, value of 6 to 8, and chroma of 1 or 2. It is loamy fine sand to fine sandy loam.

Some pedons have a Cg horizon. This horizon has hue of 5Y or 5GY, value of 5 or 6, and chroma of 1 or has hue of 10YR, value of 6 or 7, and chroma of 1. It is loamy fine sand, a mixture of sand and shell fragments, or a mixture of loamy sand, shell fragments, and calcium carbonate nodules.

Gator Series

The soils of the Gator series are loamy, siliceous, euic, hyperthermic Terric Medisaprists. They are very poorly drained soils that formed in moderately thick beds of hydrophytic plant remains underlain by beds of loamy and sandy marine sediments. These nearly level soils are in freshwater swamps and marshes. The slope is 0 to 1 percent.

Gator soils are associated with the mineral Delray, Floridana, and Manatee soils. All three of the associated soils have a mollic epipedon. Delray soils have an argillic horizon at a depth of 40 to 80 inches. Floridana soils have an argillic horizon at a depth of 20 to 40 inches. Manatee soils have an argillic horizon within a depth of 20 inches.

Typical pedon of Gator muck; in a pasture 250 feet east of Cow Pen Slough Canal, NW¼SE¼NE¼ sec. 33, T. 37 S., R. 19 E.

Oap—0 to 6 inches; very dark brown (10YR 2/2) muck; about 10 percent fiber unrubbed, less than 5 percent rubbed; weak fine subangular blocky structure; very friable; common fine and very fine roots; light yellowish brown (10YR 6/4) sodium pyrophosphate extract; slightly acid (pH 5.3 in 0.01 molar calcium chloride solution); clear smooth boundary.

Oa—6 to 22 inches; very dark brown (10YR 2/2) muck; few common dark brown (10YR 3/3) streaks; about 40 percent fiber unrubbed, 5 percent rubbed; moderate medium subangular blocky structure; friable; many fine and very fine roots; brown (10YR 5/3) sodium pyrophosphate extract; slightly acid (pH 4.4 in 0.01 molar calcium chloride solution); abrupt smooth boundary.

Cg1—22 to 26 inches; very dark gray (10YR 3/1) loamy sand; many fine and very fine roots; few fine dark gray stains along root channels; slightly acid; abrupt smooth boundary.

Cg2—26 to 44 inches; dark gray (10YR 4/1) sandy clay loam; moderate medium subangular blocky structure; common nonintersecting pressure faces on peds; slightly sticky and plastic; common fine roots; slightly acid; gradual wavy boundary.

Cg3—44 to 60 inches; dark gray (N 4/0) sandy clay loam; moderate medium subangular blocky structure; slightly sticky and slightly plastic; few fine roots; neutral; clear wavy boundary.

Cg4—60 to 80 inches; greenish gray (5GY 5/1) sand;

massive; nonsticky and nonplastic; common medium distinct dark gray (5Y 4/1) streaks along old root channels; common medium prominent yellowish brown (10YR 5/8) stains and splotches of sandy loam; slightly effervescent; moderately alkaline.

The depth to mineral material is less than 51 inches. It commonly ranges from 22 to 46 inches. Measured by the Hellige-Truog method, reaction is slightly acid to mildly alkaline in the Oap and Oa horizons. It is very strongly acid to moderately alkaline in the Cg1 horizon and slightly acid to moderately alkaline in the other Cg horizons.

The Oa or Oap horizon has hue of 10YR or 5YR or is neutral in hue. It has value of 2 or 3 and chroma of 2 or less. The sodium pyrophosphate extract has hue of 10YR, value of 2 to 4, and chroma of 4 or less; hue of 10YR, value of 5, and chroma of 2 to 4; or hue of 10YR, value of 5 or 6, and chroma of 3 or 4.

The upper part of the Cg horizon has hue of 10YR, value of 2 to 4, and chroma of 1; has hue of 10YR, value of 2, and chroma of 2; or is neutral in hue and has value of 2 to 4. It can have mottles and streaks in shades of brown or gray. It is dominantly sandy loam, sandy clay loam, or sandy clay. In some pedons, however, a layer of sand, loamy sand, or loamy fine sand 4 to 15 inches thick is directly below the Oa horizon. The content of clay ranges from 18 to 40 percent.

The lower part of the Cg horizon has hue of 5GY or 5Y, value of 5, and chroma of 1. It can have light olive brown, olive brown, or olive yellow mottles and streaks. It is sandy clay loam or sandy loam that has lenses of sand and loamy sand or that in some pedons is underlain by sand or fine sand. It has few or common, fine or medium, soft or hard, light gray fragments of carbonatic material.

Hallandale Series

The soils of the Hallandale series are siliceous, hyperthermic Lithic Psammaquents. They are poorly drained soils that formed in thin beds of sandy marine sediments. They are underlain by fractured limestone bedrock. These nearly level soils are on flats and hammocks. The slope ranges from 0 to 2 percent.

Hallandale soils are associated with Boca, Delray, EauGallie, Felda, Floridana, Holopaw, Myakka, and Pineda soils. Boca soils have limestone at a depth of 20 to 40 inches. EauGallie and Myakka soils have a spodic horizon. Felda and Pineda soils have an argillic horizon at a depth of 20 to 40 inches. Delray and Holopaw soils have an argillic horizon at a depth of more than 40 inches.

Typical pedon of Hallandale fine sand, in an area of Boca and Hallandale soils; about 400 feet west of River Road and 0.4 mile northeast of the junction of River Road and U.S. Highway 41, NE¼SE¼NE¼ sec. 44, T. 39 S., R. 20 E.

A—0 to 4 inches; dark gray (10YR 4/1) sand; weak fine granular structure; very friable, nonsticky and nonplastic; neutral; many medium roots; many very fine interstitial pores; abrupt smooth boundary.

Bw1—4 to 8 inches; brown (10YR 4/3) sand; single grained; loose; neutral; many medium roots; many very fine interstitial pores; abrupt smooth boundary.

Bw2—8 to 10 inches; brown (10YR 5/3) fine sand; single grained; loose; neutral; many medium roots; many very fine interstitial pores; abrupt smooth boundary.

Cg—10 to 14 inches; light gray (10YR 7/1) fine sand; single grained; loose; moderately alkaline; few fine roots; many fine interstitial pores; many medium distinct white (10YR 8/1) mottles; few small soft carbonate nodules; abrupt smooth boundary.

R—14 inches; hard, fractured limestone bedrock.

Fractured limestone bedrock is at a depth of 8 to 18 inches. It has scattered solution holes, which range from 4 inches to 2 feet in diameter. The texture is sand or fine sand throughout the profile.

The A horizon has hue of 10YR, value of 3 or 4, and chroma of 1 or 2. The Bw horizon has hue of 10YR, value of 4 or 5, and chroma of 3. The A and Bw horizons are slightly acid or neutral. The Cg horizon has hue of 10YR, value of 7 or 8, and chroma of 1 or 2. It has as much as 10 percent limestone gravel or soft carbonate nodules.

Holopaw Series

The soils of the Holopaw series are loamy, siliceous, hyperthermic Grossarenic Ochraqualfs. They are very poorly drained soils that formed in thick beds of sandy and loamy marine sediments. These nearly level soils are on broad, low flats; in poorly defined drainageways; and in depressions. The slope ranges from 0 to 2 percent.

Holopaw soils are associated with EauGallie, Felda, Malabar, Pineda, Pompano, and Wabasso soils. EauGallie and Wabasso soils have a spodic horizon. Malabar soils have a Bw horizon. Felda and Pineda soils have an argillic horizon at a depth of 20 to 40 inches. Pineda soils have a Bw horizon. Pompano soils are sandy throughout.

Typical pedon of Holopaw fine sand, depressional; about 0.5 mile east of the Big Slough Canal and about 5.5 miles north of U.S. Highway 41, NE¼SE¼SW¼ sec. 3, T. 39 S., R. 21 E.

Ap—0 to 4 inches; dark gray (10YR 4/1) fine sand; a mixture of organic matter and light gray sand grains having a salt-and-pepper appearance when dry; weak fine granular structure; very friable; common fine roots; slightly acid; gradual wavy boundary.

E1—4 to 40 inches; light gray (10YR 7/1) fine sand; single grained; loose; few medium roots; slightly acid; clear smooth boundary.

E2—40 to 45 inches; grayish brown (10YR 5/2) fine sand; single grained; loose; slightly acid; abrupt wavy boundary.

E3—45 to 50 inches; light brownish gray (10YR 6/2) fine sand; single grained; loose; slightly acid; clear wavy boundary.

Btg—50 to 66 inches; grayish brown (10YR 5/2) sandy loam; few fine faint yellowish brown mottles; moderate medium subangular blocky structure; slightly sticky and slightly plastic; common pockets of brown (10YR 5/3) fine sand; neutral; gradual wavy boundary.

Cg—66 to 80 inches; olive gray (5Y 5/2) loamy fine sand; weak fine subangular blocky structure; nonsticky and nonplastic; few pockets of brown (10YR 5/3) fine sand; neutral.

The thickness of the solum ranges from 50 to more than 80 inches. Reaction is slightly acid or neutral in the surface layer and subsurface layer and slightly acid to moderately alkaline in the subsoil and substratum.

The A or Ap horizon has hue of 10YR, value of 2 to 4, and chroma of 1 or 2. It is 2 to 13 inches thick. It is less than 7 inches thick if value is 3 or less. The E horizon has hue of 10YR, value of 4 to 7, and chroma of 1 or 2 or has hue of 10YR, value of 6, and chroma of 3. In some pedons it has yellowish brown mottles. The A and E horizons are sand or fine sand. The combined thickness of these horizons is more than 40 inches.

The Btg horizon has hue of 10YR to 5Y, value of 4 or 5, and chroma of 1 or 2. It has mottles in shades of brown or yellow. It is dominantly sandy loam, fine sandy loam, or sandy clay loam. In many pedons, however, it has pockets and lenses of sand or fine sand. It is 12 to 20 inches thick. Some pedons have a BCg horizon. This horizon has hue of 10YR to 5Y, value of 4 or 5, and chroma of 1 or 2. It is sandy loam or fine sandy loam.

The Cg horizon has hue of 10YR to 5Y, value of 5, and chroma of 1 or 2. It is sand, fine sand, loamy fine sand, or loamy sand.

Kesson Series

The soils of the Kesson series are siliceous, hyperthermic Typic Psammaquents. They are deep, very poorly drained soils that formed in thick marine deposits of sand and shell fragments. These nearly level soils are in tidal swamps and marshes. Under natural conditions, they are flooded during normal high tides. The slope is less than 1 percent.

Kesson soils are associated with the organic Wulfert soils. Wulfert soils are in landscape positions similar to those of the Kesson soils.

Typical pedon of Kesson muck, in an area of Kesson and Wulfert mucks, frequently flooded; on Longboat Key about 1,500 feet northwest of the New Pass Bridge and 50 feet north of State Highway 789, sec. 32, T. 36 S., R. 17 E.

Oa—0 to 7 inches; dark reddish brown (5YR 3/2) muck; massive; friable; about 30 percent fiber unrubbed, less than 5 percent rubbed; many very fine roots; strongly alkaline; abrupt smooth boundary.

Cg1—7 to 16 inches; gray (10YR 5/1) fine sand; single grained; loose; many very fine and fine roots; few fine and medium pockets of dark reddish brown muck; about 10 percent shell fragments; strongly alkaline; calcareous; gradual irregular boundary.

Cg2—16 to 30 inches; grayish brown (10YR 5/2) fine sand; single grained; loose; few very fine and fine roots; common fine and medium very dark grayish brown (10YR 3/2) streaks; about 20 percent shell fragments; moderately alkaline; calcareous; clear smooth boundary.

Cg3—30 to 80 inches; dark greenish gray (5GY 4/1) fine sand; single grained; loose; few very fine roots; about 5 percent shell fragments; a few shell fragments 3 to 30 millimeters in diameter; calcareous; moderately alkaline.

These soils are mildly alkaline to strongly alkaline throughout. They do not become extremely acid when dry. They are calcareous. Below the Oa horizon, the texture is sand or fine sand.

The Oa horizon has hue of 10YR or 5YR, value of 2 or 3, and chroma of 1 or 2. It is 0 to 7 inches thick. The fiber content ranges from 30 to 40 percent before rubbing and is less than 10 percent after rubbing. Some pedons have an A horizon.

The Cg horizon has hue of 10YR, 5Y, or 5GY, value of 4 to 6, and chroma of 1 or 2 or has hue of 5GY or 5G, value of 4, and chroma of 1. The content of shell fragments in the lower part of this horizon increases to a maximum of 30 percent with increasing depth. The upper part of the horizon can have a few fine and medium pockets of dark reddish brown or black muck.

Malabar Series

The soils of the Malabar series are loamy, siliceous, hyperthermic Grossarenic Ochraqualfs. They are poorly drained soils that formed in thick beds of sandy and loamy marine sediments. These nearly level soils are in low, narrow or broad sloughs; on flats; and in poorly defined drainageways. The slope ranges from 0 to 2 percent.

Malabar soils are associated with EauGallie, Felda, Floridana, Pompano, Holopaw, and Pineda soils. EauGallie soils have a spodic horizon. Floridana soils have a mollic epipedon. They are very poorly drained. Felda and Pineda soils have an argillic horizon at a depth of 20 to 40 inches. Holopaw soils do not have a high-chroma Bw horizon. Pompano soils are sandy throughout.

Typical pedon of Malabar fine sand; about 2 miles north of Richardson Road and 4,500 feet south of the boundary between Manatee County and Sarasota County, SW¼SW¼SW¼ sec. 4, T. 36 S., R. 19 E.

A—0 to 4 inches; dark gray (10YR 4/1) fine sand; a mixture of organic matter and light gray sand grains having a salt-and-pepper appearance when dry; weak fine granular structure; very friable; many fine and few medium roots; slightly acid; gradual smooth boundary.

E—4 to 13 inches; gray (10YR 6/1) fine sand; single grained; loose; common fine and few medium roots; medium acid; gradual wavy boundary.

Bw1—13 to 30 inches; brownish yellow (10YR 6/8) fine sand; single grained; loose; few fine and medium roots; neutral; clear smooth boundary.

Bw2—30 to 45 inches; reddish yellow (7.5YR 7/6) fine sand; single grained; loose; neutral; abrupt wavy boundary.

Btg1—45 to 50 inches; dark grayish brown (10YR 4/2) sandy clay loam; few fine distinct yellowish red (5YR 4/6) mottles; moderate medium subangular blocky structure; slightly sticky and nonplastic; neutral; gradual wavy boundary.

Btg2—50 to 80 inches; light gray (5Y 7/1) sandy clay loam; few fine faint light brownish gray mottles; weak medium subangular blocky structure; slightly sticky and nonplastic; moderately alkaline.

The thickness of the solum ranges from 46 to more than 80 inches. Reaction is medium acid or slightly acid in the surface layer and subsurface layer and ranges from slightly acid to moderately alkaline in the subsoil and substratum.

The A or Ap horizon has hue of 10YR, value of 2 to 4, and chroma of 1 or 2. It is 2 to 4 inches thick. The E horizon has hue of 10YR, value of 6, and chroma of 2 to 4 or has hue of 10YR, value of 7, and chroma of 2. In some pedons it has brownish yellow, grayish brown, or dark grayish brown mottles or stains. It is 9 to 14 inches thick. The A and E horizons are sand or fine sand.

The Bw horizon has hue of 10YR, value of 5 to 7, and chroma of 4 to 8; hue of 10YR, value of 6, and chroma of 3 to 8; or hue of 7.5YR, value of 7, and chroma of 6. It is sand or fine sand. It is 24 to 37 inches thick.

The Btg horizon and the BCg horizon, if it occurs, have hue of 10YR, value of 4 to 7, and chroma of 1 or 2 or have hue of 5Y, value of 5 or 6, and chroma of 1 or 2. In some pedons they have dark yellowish brown, yellow, light olive brown, or light brownish gray mottles. They are dominantly sandy loam, fine sandy loam, or sandy clay loam. In many pedons, however, the Btg horizon has a few intrusions of coarser textured material from the overlying horizons. In some pedons the BCg horizon is loamy fine sand. The combined thickness of the Btg and BCg horizons ranges from 12 to more than 24 inches.

Manatee Series

The soils of the Manatee series are coarse-loamy, siliceous, hyperthermic Typic Argiaquolls. They are very poorly drained soils that formed in sandy and loamy marine sediments. These nearly level soils are in depressions. The slope is dominantly less than 1 percent but in some areas is 2 percent.

Manatee soils are commonly associated with Delray, EauGallie, Floridana, and Wabasso soils. Delray and Floridana soils are in landscape positions similar to those of the Manatee soils. The sandy surface layer and subsurface layer in Delray soils have a combined thickness of more than 40 inches, and those in Floridana soils have a combined thickness of 20 to 40 inches. EauGallie and Wabasso soils are on flatwoods. They have a spodic horizon.

Typical pedon of Manatee loamy fine sand, depressional; about 2.5 miles east of State Highway 775 and about 2.75 miles west of State Highway 777, NW¼SE¼SE¼ sec. 7, T. 40 S., R. 20 E.

A—0 to 18 inches; black (N 2/0) loamy fine sand; weak fine granular structure; very friable, slightly sticky and nonplastic; neutral; clear smooth boundary.

Bt—18 to 29 inches; very dark gray (10YR 3/1) sandy loam; few fine faint yellowish red mottles; weak fine subangular blocky structure; very friable, slightly sticky and nonplastic; mildly alkaline; clear smooth boundary.

Btg—29 to 34 inches; light gray (5Y 6/1) sandy loam; weak fine subangular blocky structure; very friable, slightly sticky and nonplastic; mildly alkaline; clear smooth boundary.

BCkg—34 to 42 inches; light gray (2.5Y 7/2) sandy loam that has intrusions of calcareous sandy loam; few fine faint yellow (2.5Y 7/6) mottles; weak fine subangular blocky structure; very friable, slightly sticky and slightly plastic; about 5 percent white, hard calcium carbonate nodules; moderately alkaline; clear wavy boundary.

Cg1—42 to 60 inches; gray (5Y 5/1) sandy loam; few fine faint yellow and white and common medium distinct dark greenish gray (5GY 4/1) mottles; massive; very friable, slightly sticky and slightly plastic; moderately alkaline; clear smooth boundary.

Cg2—60 to 75 inches; dark greenish gray (5GY 4/1) and gray (5Y 5/1), stratified sandy loam and sandy clay loam; massive; very friable, slightly sticky and slightly plastic; clear smooth boundary.

Cg3—75 to 80 inches; dark greenish gray (5GY 4/1) fine sand; single grained; loose, nonsticky and nonplastic; moderately alkaline.

Reaction is medium acid to mildly alkaline in the A horizon and mildly alkaline or moderately alkaline in the B and C horizons.

The A horizon has hue of 10YR, value of 2, and chroma of 1, or it is neutral in hue and has value of 2. It is 10 to 12 inches thick.

The Bt horizon has hue of 10YR, value of 2 to 4, and chroma of 1; has hue of 10YR, value of 4, and chroma of 2; or is neutral in hue and has value of 2. It is fine sandy loam or sandy loam. It is 3 to 13 inches thick. The Btg horizon has hue of 10YR to 5Y, value of 4 to 7, and chroma of 1. It is dominantly fine sandy loam, sandy loam, or sandy clay loam. In some pedons, however, it has small pockets or streaks of fine sand or loamy fine sand. It is 9 to 29 inches thick.

The BCkg horizon, if it occurs, has hue of 10YR, value of 4, and chroma of 1 or 2 or has hue of 2.5Y, value of 6 or 7, and chroma of 2. It is loamy fine sand, fine sandy loam, or sandy loam. It is 0 to 14 inches thick.

The Cg horizon has hue of 5GY or 5Y, value of 5 or 6, and chroma of 1; hue of 5Y, value of 7, and chroma of 1; or hue of 2.5Y, value of 6, and chroma of 2. It is fine sand, loamy fine sand, fine sandy loam, or sandy loam. In some pedons it has shell fragments.

Matlacha Series

The soils of the Matlacha series are sandy, siliceous, hyperthermic Alfic Udarents. They are somewhat poorly drained soils in areas that have been dredged and filled. The dredge and fill material was spread over the surface of other soils. The fill material is a mixture of sand, shell fragments, loamy and silty sediments, and a few fragments of organic material. These nearly level soils are adjacent to coastal areas. They are subject to flooding for very brief periods during the hurricane season. The slope is 0 to 2 percent.

Matlacha soils are commonly associated with EauGallie, Felda, Myakka, and Pompano soils. None of these soils are manmade. Pompano soils do not have fragments or diagnostic horizons. They are poorly drained. EauGallie and Myakka soils have a spodic horizon. Felda soils are poorly drained. They have an argillic horizon.

Typical pedon of Matlacha gravelly sand; about 1,000 feet northwest of the entrance of U.S. Highway 41 to Charlotte County, on a spoil bank on the north side of the Cocoplum Waterway, SW¼SE¼SW¼ sec. 34, T. 39 S., R. 21 E.

C—0 to 42 inches; mixed dark brown (10YR 3/3), light brownish gray (10YR 6/2), and very pale brown (10YR 7/3) gravelly sand; massive; very friable, nonsticky and nonplastic; about 20 percent limestone gravel and shell fragments; common lenses of dark brown (10YR 4/3) sandy clay loam; moderately alkaline; abrupt wavy boundary.

Ab—42 to 46 inches; dark gray (10YR 4/1) fine sand; single grained; loose, nonsticky and nonplastic; slightly acid; clear smooth boundary.

Eb—46 to 78 inches; light gray (10YR 7/1) fine sand; single grained; loose, nonsticky and nonplastic; slightly acid; clear smooth boundary.

Bhb—78 to 80 inches; very dark grayish brown (10YR 3/2) fine sand; single grained; very friable, nonsticky and nonplastic; slightly acid.

The fill material is 20 to 60 inches thick. Reaction is neutral to moderately alkaline in the fill material and medium acid to neutral in all other horizons. The content of gravel-sized shell and rock fragments in the fill material ranges from 10 to 30 percent.

The material below the fill varies, depending on the original soil. In some pedons it is several feet of sand over loamy material, and in other pedons it is sandy throughout.

The fill material has hue of 10YR, value of 3 to 7, and chroma of 1 to 4. It is dominantly gravelly sand, but the range includes fine sand, very gravelly fine sand, and gravelly loamy sand. Lenses or lumps of sandy loam or sandy clay loam are common.

Myakka Series

The soils of the Myakka series are sandy, siliceous, hyperthermic Aeric Haplaquods. They are poorly drained soils that formed in beds of sandy marine sediments. These nearly level soils are on broad flatwoods. The slope ranges from 0 to 2 percent.

Myakka soils are associated with EauGallie, Pomello, Ona, and Smyrna soils. EauGallie soils have an argillic horizon below the Bh horizon. Pomello soils are deeper to a Bh horizon than the Myakka soils. They are moderately well drained. Ona and Smyrna soils have a Bh horizon within a depth of 20 inches.

Typical pedon of Myakka fine sand, in an area of EauGallie and Myakka fine sands; about 50 feet north of Richardson Road and about 800 feet east of the intersection of Richardson and Brown Roads, NE¼SW¼SW¼ sec. 18, T. 36 S., R. 19 E.

A—0 to 6 inches; very dark gray (10YR 3/1) fine sand; weak fine granular structure; very friable; many fine and common medium roots; strongly acid; clear smooth boundary.

E—6 to 24 inches; light gray (10YR 7/1) fine sand; single grained; loose; common medium roots; medium acid; abrupt wavy boundary.

Bh1—24 to 35 inches; black (10YR 2/1) fine sand; weak fine subangular blocky structure; friable; dense mat of partially decomposed fine and medium roots in the upper part; sand grains well coated with organic matter; strongly acid; clear wavy boundary.

Bh2—35 to 42 inches; dark reddish brown (5YR 3/3) fine sand; weak fine subangular blocky structure; friable; few fine distinct very dark gray (5YR 3/1) streaks; medium acid; clear smooth boundary.

BC—42 to 60 inches; light yellowish brown (10YR 6/4) fine sand; single grained; loose; medium acid; clear smooth boundary.

C—60 to 80 inches; pale brown (10YR 6/3) fine sand; single grained; loose; medium acid.

The solum is more than 60 inches thick. Depth to the spodic horizon ranges from 16 to 29 inches. The texture is sand or fine sand throughout the profile. Reaction generally ranges from extremely acid to slightly acid throughout the profile. It ranges from neutral to moderately alkaline, however, in some pedons that have shell fragments at a depth of about 50 inches or more.

The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1. Before rubbing, colors may have a salt-and-pepper appearance. The E horizon has hue of 10YR, value of 5 to 7, and chroma of 1 or has hue of 10YR, value of 5 or 6, and chroma of 2. The combined thickness of the A and E horizons is 20 to 30 inches.

The Bh horizon has hue of 5YR or 10YR, value of 2 or 3, and chroma of 1 to 3, or it is neutral in hue and has value of 2. In some pedons it has very dark gray streaks or weakly cemented spodic fragments. It can be weakly cemented in less than 50 percent of any subhorizon. In some pedons a dense mat of partially decomposed medium and fine roots overlies the Bh horizon. This horizon is 9 to 30 inches thick. The BC horizon has hue of 10YR, value of 3 or 4, and chroma of 2 or 3.

Some pedons have E′ and B′h horizons below the Bh horizon. These horizons have colors that are similar to those of the E and Bh horizons.

Some pedons have a C horizon. This horizon has hue of 10YR, value of 5 to 7, and chroma of 1 to 3.

Ona Series

The soils of the Ona series are sandy, siliceous, hyperthermic Typic Haplaquods. They are poorly drained soils that formed in beds of sandy marine sediments. These nearly level soils are on broad flatwoods. The slope ranges from 0 to 2 percent.

Ona soils are associated with EauGallie, Pomello, Myakka, and Smyrna soils. EauGallie soils have an argillic horizon below the Bh horizon. Pomello soils are moderately well drained. Myakka and Smyrna soils have a Bh horizon below the E horizon.

Typical pedon of Ona fine sand; about 25 feet north of Laurel Road and about 0.75 mile east of the intersection of Laurel Road and U.S. Highway 41, SE¼SW¼SW¼ sec. 30, T. 38 S., R. 19 E.

A—0 to 6 inches; dark gray (10YR 4/1) fine sand; single grained; loose, nonsticky and nonplastic; very strongly acid; clear wavy boundary.

Bh1—6 to 9 inches; dark reddish brown (5YR 3/3) fine sand; single grained; loose, nonsticky and nonplastic; very strongly acid; clear wavy boundary.

Bh2—9 to 16 inches; dark brown (10YR 3/3) fine sand; moderate medium subangular blocky structure; friable, nonsticky and nonplastic; very strongly acid; clear wavy boundary.

BC—16 to 28 inches; light yellowish brown (10YR 6/4) fine sand; weak fine subangular blocky structure; very friable, nonsticky and nonplastic; very strongly acid; clear smooth boundary.

C1—28 to 40 inches; very pale brown (10YR 7/4) fine sand; single grained; loose, nonsticky and nonplastic; very strongly acid; clear smooth boundary.

C2—40 to 72 inches; very pale brown (10YR 7/3) fine sand; few fine faint brownish yellow mottles; single grained; loose, nonsticky and nonplastic; very strongly acid; clear wavy boundary.

C3—72 to 80 inches; light gray (10YR 7/1) fine sand; single grained; loose, nonsticky and nonplastic; strongly acid.

Reaction ranges from extremely acid to slightly acid throughout the profile. The texture is sand or fine sand throughout the profile. The solum is 9 to 24 inches thick.

The A or Ap horizon has hue of 10YR, value of 2 to 5, and chroma of 1 or 2. It is 4 to 9 inches thick.

The Bh horizon has hue of 5YR to 10YR, or it is neutral in hue. It has value of 2 or 3 and chroma of 3 or less. It is 5 to 15 inches thick. The BC horizon, if it occurs, has hue of 10YR, value of 4 to 6, and chroma of 3 or 4.

The C horizon has hue of 10YR to 5Y, value of 6 or 7, and chroma of 1 to 4. It extends to a depth of 80 inches or more.

Orsino Series

The soils of the Orsino series are hyperthermic, uncoated Spodic Quartzipsamments. They are moderately well drained soils that formed in sandy marine and eolian deposits. These nearly level to gently sloping soils are on slightly elevated ridges and knolls. The slope ranges from 0 to 5 percent.

Typical pedon of Orsino fine sand; about 10 feet north of Laurel Road and about 1.3 miles east of the intersection of Laurel Road and U.S. Highway 41, NE¼NW¼NE¼ sec. 31, T. 38 S., R. 19 E.

Ap—0 to 6 inches; gray (10YR 5/1) fine sand; single grained; loose; many fine and medium and few coarse roots; very strongly acid; clear wavy boundary.

EBw—6 to 18 inches; light gray (10YR 7/1) fine sand that has intrusions of yellowish brown (10YR 5/6) B material; single grained; loose; common fine and medium and few coarse roots; very strongly acid; abrupt irregular boundary.

Bw&Bh—18 to 22 inches; dark reddish brown (5YR 3/2) fine sand in discontinuous, 1- to 5-centimeter lenses separated by brown (7.5YR 4/4) fine sand; single grained; loose; few fine and coarse and common medium roots; very strongly acid; clear irregular boundary.

BC—22 to 40 inches; very pale brown (10YR 7/3) fine sand; few medium distinct brownish yellow (10YR 6/6) streaks; single grained; loose; few fine and medium roots; very strongly acid; gradual irregular boundary.

C—40 to 80 inches; light gray (10YR 7/2) fine sand; few fine and medium, prominent, black (10YR 2/1), firm to weakly cemented spodic bodies 1 to 3 centimeters in diameter; single grained; loose; few fine and medium roots; strongly acid.

Reaction ranges from extremely acid to medium acid throughout the profile. The texture is sand or fine sand to a depth of 80 inches or more. The content of silt and clay is less than 5 percent in the 10- to 40-inch control section.

The A horizon has hue of 10YR, value of 4 or 5, and chroma of 1. It is less than 5 inches thick. Some pedons have an E horizon. This horizon has hue of 10YR, value of 7 or 8, and chroma of 1 or 2. It is about 14 to 32 inches thick.

The Bw part of the Bw&Bh horizon has hue of 10YR, value of 5, and chroma of 4 to 8; hue of 10YR, value of 6, and chroma of 3 to 6; or hue of 7.5YR, value of 4, and chroma of 4. Light gray or white tongues of the E horizon extend into this horizon. In some pedons thin, discontinuous layers or lenses of the Bh horizon are at the point of contact between the E horizon and the Bw&Bh horizon. These layers and the Bh part of the Bw&Bh horizon have hue of 10YR, value of 2 or 3, and chroma of 2; hue of 5YR, value of 3, and chroma of 2 to 4; or hue of 10YR, value of 4, and chroma of 3. The Bh horizon also occurs as weakly cemented to uncemented bodies or splotches. The Bw&Bh horizon is about 4 to 30 inches thick.

The BC horizon, if it occurs, has hue of 10YR, value of 5, and chroma of 4 to 8; hue of 10YR, value of 6, and chroma of 3 to 6; hue of 7.5YR, value of 4, and chroma of 4; or hue of 10YR, value of 6 to 8, and chroma of 3 or 4. In some pedons it has yellowish brown, brownish yellow, or yellow stains or mottles. It is 0 to more than 27 inches thick.

The C horizon, if it occurs, has hue of 10YR, value of 6 or 7, and chroma of 3 or 4 or has hue of 10YR, value of 8, and chroma of 1 to 4.

Pineda Series

The soils of the Pineda series are loamy, siliceous, hyperthermic Arenic Glossaqualfs. They are poorly drained soils that formed in thick beds of sandy and loamy marine sediments. These nearly level soils are on low hammocks and in broad, poorly defined sloughs. The slope ranges from 0 to 2 percent.

Pineda soils are associated with Felda, Holopaw, Malabar, and Pople soils. Holopaw soils are in depressions. Felda, Malabar, and Pople soils are in landscape positions similar to those of the Pineda soils. Malabar and Holopaw soils are sandy to a depth of more than 40 inches. Felda soils do not have a high-chroma Bw horizon. Pople soils are calcareous in parts of the subsoil.

Typical pedon of Pineda fine sand; about 0.4 mile north of Richardson Road and 1.2 miles east of the intersection of Richardson and Brown Roads, SW¼SE¼NW¼ sec. 17, T. 36 S., R. 19 E.

Ap—0 to 8 inches; dark gray (10YR 4/1) fine sand; single grained; loose, nonsticky and nonplastic; strongly acid; abrupt smooth boundary.

E—8 to 22 inches; gray (10YR 6/1) fine sand; single grained; loose, nonsticky and nonplastic; neutral; clear smooth boundary.

Bw—22 to 30 inches; dark yellowish brown (10YR 4/4) fine sand; single grained; loose, nonsticky and nonplastic; medium acid; clear smooth boundary.

E′—30 to 36 inches; pale brown (10YR 6/3) fine sand; single grained; loose, nonsticky and nonplastic; medium acid; clear wavy boundary.

Btg—36 to 48 inches; light brownish gray (10YR 6/2) fine sandy loam; many medium distinct dark yellowish brown (10YR 4/6) and pale brown (10YR 6/3) tongues; weak medium subangular blocky structure; very friable, slightly sticky and slightly plastic; neutral; clear smooth boundary.

Cg1—48 to 60 inches; grayish brown (10YR 5/2) fine sand; single grained; loose, nonsticky and nonplastic; neutral; clear smooth boundary.

Cg2—60 to 80 inches; dark grayish brown (10YR 4/2) fine sand; single grained; loose, nonsticky and nonplastic; neutral.

The solum is 40 to 80 inches thick. The combined thickness of the A and Bw horizons is 20 to 40 inches. The A and B horizons range from strongly acid to mildly alkaline. The C horizon ranges from slightly acid to moderately alkaline.

The A or Ap horizon has hue of 10YR, value of 2 to 4, and chroma of 1 or has hue of 10YR, value of 5, and chroma of 2. It is 2 to 9 inches thick. It is sand or fine sand. The E horizon also is sand or fine sand. It has hue of 10YR, value of 5 or 6, and chroma of 2. It is 5 to 9 inches thick.

The Bw horizon has hue of 10YR, value of 5 to 7, and chroma of 6 to 8. It is 4 to 16 inches thick. It is sand or fine sand. In some pedons a thin, discontinuous, dark brown to black Bh horizon is at the base of the Bw horizon. The E′ horizon has hue of 10YR, value of 6 to 8, and chroma of 3 or 4.

The Btg horizon has hue of 10YR, 5Y, or 5BG, value of 5, and chroma of 1; hue of 5Y, value of 4, and chroma of 1; or hue of 2.5Y, value of 4, and chroma of 2. It has yellowish brown, olive, or olive yellow mottles. It is sandy loam or sandy clay loam. Tongues of sand or fine sand extend into this horizon from the horizons above. They have hue of 10YR, value of 6 to 8, and chroma of 3 or 4.

The Cg horizon has hue of 5Y, 5GY, or 5BG, value of 4 to 7, and chroma of 1 or 2. It is fine sand to sandy clay loam. The content of sand-sized shell fragments ranges from none to many.

Pomello Series

The soils of the Pomello series are sandy, siliceous, hyperthermic Arenic Haplohumods. They are moderately well drained soils that formed in thick beds of sandy marine sediments. These nearly level to gently sloping soils are on low ridges and knolls on flatwoods. The slope ranges from 0 to 2 percent.

Pomello soils are associated with Cassia, EauGallie, Myakka, Orsino, and Tavares soils. Cassia, Orsino, and Tavares soils are in landscape positions similar to those of the Pomello soils. EauGallie and Myakka soils are poorly drained and are on flatwoods. Cassia soils do not have a thick surface layer of sandy material. Orsino and Tavares soils do not have a continuous spodic horizon.

Typical pedon of Pomello fine sand; about 25 feet north of Bee Ridge Road and 2 miles west of the intersection of Bee Ridge Road and State Highway 72, SW¼SE¼NW¼ sec. 18, T. 37 S., R. 19 E.

A—0 to 4 inches; dark gray (10YR 4/1) fine sand; a mixture of organic matter and light gray sand grains having a salt-and-pepper appearance when dry; weak fine granular structure; very friable; few fine and medium roots; strongly acid; clear smooth boundary.

E—4 to 48 inches; light gray (10YR 7/2) fine sand; single grained; loose; few fine and medium roots; few grayish brown streaks along root channels; medium acid; gradual smooth boundary.

Bh—48 to 80 inches; dark reddish brown (5YR 2/2) fine sand; weak fine subangular blocky structure; friable; thin mat of decomposed roots; few fine roots; strongly acid.

Depth to the spodic horizon ranges from 30 to 50 inches. The texture is sand or fine sand throughout the profile. Reaction ranges from very strongly acid to medium acid throughout the profile.

The A horizon has hue of 10YR, value of 3 to 5, and chroma of 1. Before rubbing, colors may have a salt-and-pepper appearance. This horizon is 1 to 6 inches thick. The E horizon has hue of 10YR, value of 6 to 8, and chroma of 1 or 2. In some pedons it has dark gray streaks along root channels. The combined thickness of the A and E horizons is more than 30 inches.

The Bh horizon has hue of 5YR to 10YR, value of 2 or 3, and chroma of 1 to 3. In some pedons it has weakly cemented fragments of Bh material. These fragments make up less than half of the horizon or have a thin mat of decomposed roots on the surface. Some pedons have a BC horizon. This horizon has hue of 10YR, value of 3 or 4, and chroma of 3 or has hue of 7.5YR, value of 4, and chroma of 2.

Some pedons have a C horizon. This horizon has hue of 10YR, value of 5 or 6, and chroma of 1 or has hue of 10YR, value of 5, and chroma of 2.

Pompano Series

The soils of the Pompano series are siliceous, hyperthermic Typic Psammaquents. They are poorly drained soils that formed in thick deposits of sandy marine sediments. These nearly level soils are on flood plains and in depressions. The slope ranges from 0 to 2 percent.

Pompano soils are commonly associated with Felda, Holopaw, and Malabar soils. Holopaw and Felda soils are in landscape positions similar to those of the Pompano soils. Felda soils have an argillic horizon at a depth of 20 to 40 inches. Holopaw and Malabar soils have an argillic horizon at a depth of more than 40 inches. Malabar soils have a high-chroma Bw horizon. They are in sloughs and along the margins of depressions and drainageways.

Typical pedon of Pompano fine sand, in an area of Felda and Pompano fine sands, frequently flooded; about 1.3 miles west of Cow Pen Slough Canal and 1 mile north of Salt Creek, SW¼NE¼NE¼ sec. 20, T. 38 S., R. 19 E.

A—0 to 3 inches; black (10YR 2/1) fine sand; a mixture of organic matter and light gray sand grains having a salt-and-pepper appearance when dry; single grained; loose; many fine and common medium roots; very strongly acid; gradual wavy boundary.

Cg1—3 to 16 inches; gray (10YR 6/1) fine sand; single grained; loose; common fine and few medium roots; very strongly acid; clear smooth boundary.

Cg2—16 to 60 inches; light brownish gray (10YR 6/2) fine sand; single grained; loose; few medium roots; very strongly acid; clear smooth boundary.

Cg3—60 to 80 inches; grayish brown (10YR 5/2) fine sand; single grained; loose; strongly acid.

Reaction ranges from very strongly acid to mildly alkaline throughout the profile. The texture is sand or fine sand to a depth of 80 inches or more.

The A horizon has hue of 10YR, value of 2 to 4, and chroma of 1. Before rubbing, colors may have a salt-and-pepper appearance. This horizon is 3 to 6 inches thick.

The C horizon has hue of 10YR, value of 5 to 7, and chroma of 3 or less. In some pedons it has pale brown, brownish yellow, or brown mottles and streaks.

Pople Series

The soils of the Pople series are loamy, siliceous, hyperthermic Arenic Ochraqualfs. They are poorly drained soils that formed in sandy and loamy marine sediments under conditions favoring the accumulation of carbonates. These nearly level soils are on flatwoods. The slope is 0 to 1 percent.

Pople soils are associated with EauGallie, Ft. Green, Malabar, and Pineda soils. Malabar and Pineda soils are in landscape positions similar to those of the Pople soils. Malabar soils have an argillic horizon at a depth of more than 40 inches. Pineda soils are noncalcareous. EauGallie and Ft. Green soils are on flatwoods. EauGallie soils have a spodic horizon. Ft. Green soils are noncalcareous and have gravel in the argillic horizon.

Typical pedon of Pople fine sand; about 1.5 miles west of Cow Pen Slough Canal and 3.5 miles south of Bee Ridge Road, on the section line between sections 31 and 32, about 700 feet north of the section corner, T. 37 S., R. 19 E.

A—0 to 4 inches; very dark grayish brown (10YR 3/2) fine sand; single grained; loose, nonsticky and nonplastic; medium acid; many fine roots; clear smooth boundary.

E—4 to 7 inches; light brownish gray (10YR 6/2) fine sand; single grained; loose, nonsticky and nonplastic; medium acid; many fine roots; clear smooth boundary.

Bw—7 to 17 inches; brown (7.5YR 4/4) fine sand; single grained; loose, nonsticky and nonplastic; moderately alkaline; many fine roots; clear smooth boundary.

Bk—17 to 28 inches; brownish yellow (10YR 6/6) fine sand; single grained; loose, nonsticky and nonplastic; moderately alkaline; common fine soft masses of calcium carbonate; many fine roots; clear smooth boundary.

Btk—28 to 56 inches; gray (10YR 5/1) fine sandy loam; weak coarse subangular blocky structure; friable, sticky and nonplastic; moderately alkaline; mixed with secondary calcium carbonates throughout; few fine roots; clear smooth boundary.

Cg—56 to 80 inches; gray (5Y 5/1) fine sand; massive; very friable, nonsticky and nonplastic; moderately alkaline.

The combined thickness of the A, E, and Bw horizons ranges from 20 to 40 inches. Reaction ranges from medium acid to mildly alkaline in the A and E horizons and is mildly alkaline or moderately alkaline in all of the other horizons. All of the horizons above the Btk horizon are sand or fine sand.

The A horizon has hue of 10YR, value of 2 to 4, and chroma of 1 or 2. The E horizon has hue of 10YR, value of 5 or 6, and chroma of 1 or 2.

The Bw horizon, if it occurs, has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 or 4. The Bk horizon has hue of 10YR, value of 5 to 7, and chroma of 2 to 4. Secondary calcium carbonates in this horizon occur as soft masses or as part of the matrix.

The Btk horizon has hue of 10YR to 5GY, value of 5 to 7, and chroma of 2 to 8. Secondary calcium carbonates are mixed throughout the matrix in this horizon and are commonly associated with high-chroma colors. This horizon is fine sandy loam or sandy clay loam.

The Cg horizon has hue of 10YR to 5Y, value of 5 to 7, and chroma of 1 or 2. It is sand, fine sand, or loamy sand.

Smyrna Series

The soils of the Smyrna series are sandy, siliceous, hyperthermic Aeric Haplaquods. They are poorly drained soils that formed in beds of sandy marine sediments. These nearly level soils are on broad flatwoods. The slope ranges from 0 to 2 percent.

Smyrna soils are associated with EauGallie, Pomello, Myakka, and Ona soils. EauGallie soils have an argillic horizon below the Bh horizon. Myakka and Pomello soils are deeper to a Bh horizon than the Smyrna soils. Pomello soils are moderately well drained. Ona soils have a Bh horizon within a depth of 10 inches.

Typical pedon of Smyrna fine sand; about 0.4 mile east of Venice Byway and about 0.6 mile north of Curry Creek Coral, SW¼NE¼SW¼ sec. 32, T. 38 S., R. 19 E.

Ap—0 to 7 inches; dark gray (10YR 4/1) fine sand; single grained; loose, nonsticky and nonplastic; medium acid; clear smooth boundary.

E—7 to 12 inches; light gray (10YR 7/1) fine sand; single grained; loose, nonsticky and nonplastic; medium acid; clear smooth boundary.

Bh—12 to 30 inches; dark reddish brown (5YR 2/2) fine sand; weak fine subangular blocky structure; friable, nonsticky and nonplastic; medium acid; clear wavy boundary.

C1—30 to 40 inches; very pale brown (10YR 7/4) fine sand; few fine distinct yellowish brown (10YR 5/6) mottles; single grained; loose, nonsticky and nonplastic; medium acid; gradual wavy boundary.

C2—40 to 52 inches; very pale brown (10YR 7/3) fine sand; few fine distinct yellowish brown (10YR 5/4) mottles; single grained; loose, nonsticky and nonplastic; strongly acid; gradual wavy boundary.

C3—52 to 80 inches; pale brown (10YR 6/3) fine sand; few fine distinct dark yellowish brown (10YR 4/4) mottles; single grained; loose, nonsticky and nonplastic; medium acid.

The solum is more than 60 inches thick. Depth to the spodic horizon ranges from 10 to 20 inches. The texture is sand or fine sand throughout the profile. Reaction generally ranges from extremely acid to slightly acid throughout the profile. It ranges from neutral to moderately alkaline, however, in some pedons that have shell fragments at a depth of about 50 inches or more.

The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1. Before rubbing, colors may have a salt-and-pepper appearance. The E horizon has hue of 10YR, value of 5 to 7, and chroma of 1 or has hue of 10YR, value of 5 or 6, and chroma of 2. The combined thickness of the A and E horizons is 10 to 20 inches.

The Bh horizon has hue of 5YR or 10YR, value of 2 or 3, and chroma of 1 to 3, or it is neutral in hue and has value of 2. In some pedons it has very dark gray streaks or weakly cemented spodic fragments. It can be weakly cemented in less than 50 percent of any subhorizon. In some pedons a dense mat of partially decomposed medium and fine roots overlies the Bh horizon. This horizon is 9 to 30 inches thick.

Some pedons have an E'&Bh horizon below the Bh horizon. The colors of this horizon are similar to those of the E and Bh horizons.

The C horizon, if it occurs, has hue of 10YR, value of 5 to 7, and chroma of 1 to 3.

St. Augustine Series

The soils of the St. Augustine series are sandy, siliceous, hyperthermic Alfic Udarents. They are somewhat poorly drained soils in areas that have been dredged or filled. The dredge and fill material was spread over the surface of former tidal areas. The original soils in these tidal areas are very poorly drained. The fill material is a mixture of sand, shell fragments, loamy and silty sediments, and a few fragments of organic material. These nearly level soils are adjacent to coastal areas. They are subject to flooding for very brief periods during the hurricane season. The slope is 0 to 2 percent.

St. Augustine soils are associated with Bradenton, Canaveral, Delray, and Myakka soils. Bradenton and Myakka soils are on flatwoods. Bradenton soils have an argillic horizon. Myakka soils have a spodic horizon. Delray soils are in depressions. They have a mollic epipedon and an argillic horizon. Canaveral soils are on ridges in coastal areas. They are natural sandy soils.

Typical pedon of St. Augustine fine sand; 100 feet east of the intersection of State Highways 758 and 72, about 30 feet south of State Highway 72 on Siesta Key:

C1—0 to 2 inches; gray (10YR 6/1) fine sand; single grained; loose, nonsticky and nonplastic; moderately alkaline; abrupt smooth boundary.

C2—2 to 20 inches; mixed very dark gray (10YR 3/1), gray (10YR 4/1), and dark brown (7.5YR 4/4) fine sand; single grained; loose, nonsticky and nonplastic; moderately alkaline; abrupt smooth boundary.

C3—20 to 28 inches; very dark grayish brown (10YR 3/2) fine sand that has a few medium-sized peds of sandy clay loam from an argillic horizon; loose, nonsticky and nonplastic in the fine sand; moderately alkaline; many sand-sized shell fragments; abrupt smooth boundary.

C4—28 to 35 inches; grayish brown (10YR 5/2) fine sand; single grained; loose, nonsticky and nonplastic; moderately alkaline; many sand-sized shell fragments; abrupt smooth boundary.

C5—35 to 42 inches; very dark grayish brown (10YR 3/2) sandy clay loam; massive; very friable, slightly sticky and slightly plastic; moderately alkaline; many sand-sized shell fragments; abrupt smooth boundary.

C6—42 to 55 inches; grayish brown (10YR 5/2) fine sand; single grained; loose, nonsticky and nonplastic; moderately alkaline; many sand-sized shell fragments; abrupt smooth boundary.

C7—55 to 65 inches; very dark grayish brown (10YR 3/2) fine sand that has common medium-sized peds of grayish brown (2.5Y 5/2) sandy clay loam; single grained; very friable, slightly sticky and nonplastic; moderately alkaline; abrupt smooth boundary.

C8—65 to 80 inches; dark grayish brown (10YR 4/2) fine sand; single grained; loose, nonsticky and nonplastic; moderately alkaline.

Reaction ranges from slightly acid to moderately alkaline throughout the profile. The thickness of the fill material ranges from 40 to more than 80 inches. The content of shell fragments ranges from less than 5 percent to 70 percent. By weighted average, the content of shell fragments 2 millimeters or larger is less than 20 percent in the control section. Some pedons are stratified with shell fragments. Depth to the loamy or clayey material is less than 40 inches.

The C horizon has hue of 10YR, value of 3 to 7, and chroma of 1 or 2. In some pedons the upper part of this horizon has mottles in shades of gray, brown, or yellow. It is sand or fine sand. Shell fragments or lenses of loamy material are mixed with the sand or fine sand. The upper part of the C horizon is 6 to 30 inches thick, and the lower part is 10 to 30 inches thick. The lower part is dominantly sand, fine sand, or loamy sand but has few or common bodies of silty clay loam, clay loam, or sandy clay loam. These bodies have hue of 5GY or 5Y, value of 4 or 5, and chroma of 1 or 2. Few or common shell fragments and fragments of histic material are in the lower part of the C horizon.

Some pedons have an organic horizon at a depth of more than 40 inches.

Tavares Series

The soils of the Tavares series are hyperthermic, uncoated Typic Quartzipsamments. They are moderately well drained soils that formed in thick deposits of sandy marine or eolian sediments. These nearly level to sloping soils are on coastal ridges and elevated knolls on flatwoods. The slope ranges from 0 to 2 percent.

Tavares soils are associated with Cassia, Orsino, Myakka, and Pomello soils. Cassia, Orsino, and Pomello soils are in landscape positions similar to those of the Tavares soils. Myakka soils are on flatwoods. Cassia, Myakka, and Pomello soils have a spodic horizon. Orsino soils have a discontinuous spodic horizon.

Typical pedon of Tavares fine sand; about 0.2 mile west of the Manatee County line and 0.8 mile east of State Highway 780, SW¼SE¼NE¼ sec. 24, T. 36 S., R. 20 E.

Ap—0 to 6 inches; dark grayish brown (10YR 4/2) fine sand; a mixture of uncoated sand grains and organic matter having a salt-and-pepper appearance; single grained; loose; common fine and medium roots; neutral; abrupt smooth boundary.

C1—6 to 28 inches; brownish yellow (10YR 6/6) fine sand; single grained; loose; common fine and medium roots; neutral; gradual wavy boundary.

C2—28 to 51 inches; light gray (10YR 7/1) fine sand;

single grained; loose; few fine and medium roots; slightly acid; gradual wavy boundary.

C3—51 to 80 inches; gray (10YR 6/1) fine sand; single grained; loose; few fine and medium roots; medium acid.

Reaction ranges from extremely acid to medium acid in the A horizon and from strongly acid to slightly acid in the C horizon. The texture is sand or fine sand to a depth of more than 80 inches. The content of silt and clay is 5 percent or less between depths of 10 and 40 inches.

The A horizon has hue of 10YR, value of 4 or 5, and chroma of 1. It has varying amounts of fine black (10YR 2/1) organic matter granules. It is 2 to 6 inches thick.

The upper part of the C horizon has hue of 10YR, value of 5 to 7, and chroma of 3 to 6. The lower part has hue of 10YR, value of 5 to 7, and chroma of 1 or 2.

Wabasso Series

The soils of the Wabasso series are sandy, siliceous, hyperthermic Alfic Haplaquods. They are poorly drained soils that formed in sandy and loamy marine sediments. These nearly level soils are on broad flatwoods. The slope ranges from 0 to 2 percent.

Wabasso soils are associated with Boca, EauGallie, Felda, and Pineda soils. All of the associated soils are poorly drained. Boca and EauGallie soils are in landscape positions similar to those of the Wabasso soils. EauGallie soils have an argillic horizon below a depth of 40 inches. Boca soils are underlain by limestone bedrock. Felda soils are on broad, low flats and in depressions. They do not have a spodic horizon. Pineda soils are in depressions and sloughs. They do not have a spodic horizon.

Typical pedon of Wabasso fine sand; about 1 mile south of State Highway 780 and 1.5 miles east of Old Myakka, NE¼NE¼SW¼ sec. 27, T. 36 S., R. 20 E.

Ap—0 to 5 inches; black (10YR 2/1) fine sand; weak fine granular structure; very friable; many fine and medium roots; strongly acid; gradual wavy boundary.

E—5 to 8 inches; gray (10YR 6/1) fine sand; single grained; loose; common fine and medium roots; strongly acid; abrupt wavy boundary.

Bh—8 to 18 inches; very dark gray (10YR 3/1) fine sand; weak medium subangular blocky structure; friable; few fine and medium roots; sand grains well coated with colloidal organic matter; medium acid; clear smooth boundary.

E′—18 to 25 inches; light gray (10YR 7/1) fine sand; few fine and medium roots; medium acid; abrupt smooth boundary.

Btg1—25 to 56 inches; dark gray (10YR 4/1) sandy loam; few fine distinct brown (10YR 4/4) streaks; moderate medium subangular blocky structure; slightly sticky and slightly plastic; few fine and medium roots; medium acid; gradual wavy boundary.

Btg2—56 to 80 inches; dark gray (10YR 5/1) fine sandy loam; weak medium subangular blocky structure; slightly sticky and slightly plastic; few fine and medium roots; medium acid.

The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1. It is 5 to 8 inches thick. The E horizon has hue of 10YR, value of 5 to 7, and chroma of 1 or 2. It is 2 to 13 inches thick. It is very strongly acid to medium acid. It is sand or fine sand. The combined thickness of the A and E horizons is less than 30 inches.

In some pedons a mat of fine and medium roots overlies the Bh horizon. This horizon has hue of 5YR, value of 2 or 3, and chroma of 1; hue of 10YR, value of 2 or 3, and chroma of 1 or 2; or hue of 10YR and value and chroma of 3. It is sand or fine sand. The sand grains are coated with organic matter. This horizon is 5 to 12 inches thick. It ranges from very strongly acid to slightly acid. The E horizon, if it occurs, is similar to the E horizon.

The Bt horizon has hue of 10YR to 5Y, value of 3 to 6, and chroma of 1 to 3. In some pedons it has few or common, fine or medium light olive brown or yellowish brown mottles and very dark gray or black streaks and pockets. It is fine sandy loam, sandy loam, or sandy clay loam. It ranges from medium acid to moderately alkaline.

Some pedons have an AC horizon. This horizon has hue of 5Y, value of 5 or 6, and chroma of 2; hue of 5Y, value of 6, and chroma of 3; hue of 5GY, value of 6, and chroma of 1; hue of 10YR, value of 4 or 5, and chroma of 3; or hue of 7.5YR, value of 5, and chroma of 2. It is sand, loamy sand, loamy fine sand, or a mixture of sand or loamy sand and shell fragments. It ranges from neutral to moderately alkaline.

Wulfert Series

The soils of the Wulfert series are sandy or sandy-skeletal, siliceous, euic, hyperthermic Terric Sulfihemists. They are very poorly drained soils that formed in moderately thick beds of hydrophytic nonwoody plant residue. These nearly level soils are in tidal marshes and swamps. Under natural conditions, they are flooded during normal high tides. The slope is less than 2 percent.

Wulfert soils are commonly associated with Canaveral, Kesson, and St. Augustine soils. Canaveral soils are in areas of coastal dunes on ridges. They are moderately well drained. Kesson soils are in tidal marshes and swamps. They are mineral soils. St. Augustine soils are manmade soils in areas that have been dredged and filled.

Typical pedon of Wulfert muck, in an area of Kesson and Wulfert mucks, frequently flooded; about 0.2 mile south of U.S. Highway 41 and 50 feet east of the Myakka River, NW¼SE¼NE¼ sec. 34, T. 39 S., R. 20 E.

Oa1—0 to 30 inches; black (10YR 2/1) muck; about 10 percent fiber unrubbed, less than 5 percent rubbed; moderate fine subangular blocky structure; nonsticky and nonplastic; slightly acid; strong smell of sulfur when horizon is first exposed; abrupt smooth boundary.

Oa2—30 to 38 inches; black (N 2/0) muck; massive; nonsticky and nonplastic; strong smell of sulfur when horizon is first exposed; slightly acid; about 75 percent mineral material, mostly fine sand; abrupt smooth boundary.

Cg1—38 to 66 inches; dark gray (10YR 4/1) fine sand; single grained; loose, nonsticky and nonplastic; strong smell of sulfur when horizon is first exposed; slightly acid; clear smooth boundary.

Cg2—66 to 80 inches; grayish brown (10YR 5/2) fine sand; single grained; loose, nonsticky and nonplastic; strong smell of sulfur when horizon is first exposed; slightly acid.

The thickness of the organic material ranges from 16 to 50 inches. The soils range from strongly acid to slightly acid under natural conditions and from extremely acid to slightly acid after drying.

The Oa horizon has hue of 5YR to 10YR, value of 2 or 3, and chroma of 1 or 2. Before rubbing, the content of fiber is less than 33 percent. It is less than 5 percent after rubbing. The sodium pyrophosphate extract has hue of 10YR, value of 2 to 4, and chroma of 4 or less; hue of 10YR, value of 5, and chroma of 2 to 8; hue of 10YR, value of 6, and chroma of 3 to 8; or hue of 10YR, value of 7, and chroma of 4 to 8.

The Cg horizon has hue of 10YR, value of 5 or 6, and chroma of 1. It is sand or fine sand.

Formation of the Soils

In this section, the factors of soil formation are related to the soils in Sarasota County. Also, the processes of horizon differentiation are described.

Factors of Soil Formation

Soil forms through processes acting on deposited or accumulated geologic material. The kind of soil that forms depends on five major factors. These factors are the type of parent material; the climate under which soil material has existed since accumulation; the plant and animal life in and on the soil; the relief, or lay of the land; and the length of time that the forces of soil formation have acted on the soil material.

The five soil-forming factors are interdependent. Each modifies the effects of the others. Any one of the factors can have more influence than the others on the formation of a soil and can account for most of its properties. For example, if the parent material is quartz sand, the soil generally has weakly expressed horizons. In some areas the effect of the parent material is modified greatly by climate, relief, and plants and animals in and on the soil. As a soil forms, it is influenced by more than one of the five factors, but in places one factor has a predominant effect. A modification or variation in any of these factors results in a different kind of soil.

Parent Material

Parent material is the unconsolidated mass in which a soil forms. It determines the limits of the chemical and mineralogical composition of the soil. The parent material of the soils of Sarasota County generally occurs as beds of sandy and clayey material that was transported and deposited by seawater, which covered the county a number of times during the Pleistocene. During high stands of the sea, Miocene-Pliocene sediments were eroded and redeposited or were reworked on the shallow sea bottom to form marine terraces *(4)*.

Climate

Sarasota County has a tropical climate near the coast and a humid subtropical climate in other areas. Extreme temperatures are moderated by the Gulf of Mexico and the Myakka River. The average rainfall is about 53 inches per year. In summer the climate is uniform throughout the county.

Climate has caused few differences among the soils in the county. It has aided in the rapid decomposition of organic matter, however, and has hastened chemical reactions in the soils. The heavy rainfall has leached the soils of most plant nutrients. As a result, many of the sandy soils are strongly acid. Rainfall that has penetrated the surface has carried the less soluble fine particles downward in the soil profile. Because of these climatic conditions, many soils are sandy and have a low content of organic matter, a low level of natural fertility, and a low available water capacity.

Plants and Animals

Plants have been the principal biological factor in the formation of soils in the county. Animals, insects, bacteria, and fungi have also been important agents. Plants and animals furnish organic matter to the soil and bring plant nutrients from the lower layers to the upper layers of the soil. In places plants and animals result in differences in the content of organic matter, nitrogen, and plant nutrients among the soils and differences in soil structure and porosity. For example, crayfish and tree roots have penetrated the loamy subsoil in some soils and mixed the sandy surface layer with the subsoil.

Micro-organisms, including bacteria and fungi, help to weather and break down minerals and to decompose organic material. These organisms are most numerous in the upper few inches of the soil. Earthworms and other small animals inhabiting the soil alter the chemical composition of the soil and mix the soil material.

Human activities have influenced soil formation in the county. Forests have been cleared, soils have been cultivated, wet areas have been drained, and different kinds of plants have been introduced. The complex of living organisms that affect soil formation has been changed because of human activities. Nevertheless, these activities have had little effect on the soils, except for the loss of organic matter.

Relief

Relief has affected the formation of soils in Sarasota County mainly through its influence on soil and water relationships. Other factors generally associated with relief, for example, erosion, temperature, and plant cover, are of minor importance.

The county is made up of flatwoods, swamps and marshes, and the coastal ridge. Differences among the soils in these areas are directly related to relief. The soils on flatwoods have a high water table and are periodically wet to the surface. Therefore, they are not so highly leached as the soils on the coastal ridge. The soils in the swamps and marshes are covered with water for long periods. In many places they have a high content of organic matter. The deep, sandy soils on the coastal ridge are at a higher elevation than the soils on flatwoods and in swamps and marshes. Also, they are better drained and are not so strongly influenced by a ground water table. They are more susceptible to erosion, however, than the soils in other parts of the county.

Time

Time is an important factor of soil formation. The physical and chemical changes brought about by climate, living organisms, and relief occur at a slow rate. The length of time needed to convert raw geologic material into a soil varies, depending on the nature of the geologic material and the interaction of the other soil-forming factors. Some of the basic minerals in which soils form weather fairly rapidly; other minerals are chemically inert and show little evidence of change over long periods. The development of horizons through the translocation of fine particles within the soil varies under different conditions, but the soil-forming processes always take a relatively long period.

The geologic material in Sarasota County is dominantly inactive. The sand is almost pure quartz and is highly resistant to weathering. The finer textured silts and clays are the product of earlier weathering. In terms of geologic time, relatively little time has elapsed since the material in which the soils formed was laid down or emerged from the sea. The loamy and clayey horizons formed in place through the translocation of clay.

Processes of Horizon Differentiation

Soil morphology refers to the process of horizon differentiation. The differentiation of horizons in the soils in Sarasota County is the result of the accumulation of organic matter, the leaching of carbonates, the reduction and transfer of iron, or the accumulation of silicate clay minerals. More than one of these processes may be involved in the differentiation of horizons.

Some organic matter has accumulated in the upper layers of most of the soils in the county. An A horizon forms as a result of this accumulation. The content of organic matter is low in some of the soils and fairly high in others.

Carbonates and salts have been leached to varying degrees in all of the soils. Because the leaching permitted the subsequent translocation of silicate clay minerals in some soils, the effects of leaching have been indirect.

Chemical reduction, or gleying, is evident in many of the soils in Sarasota County. It does not occur in excessively drained soils. It is caused by wetness. A gray matrix in the B horizon of many soils in the county and grayish mottles in some soils indicate the reduction of iron. In some sandy soils, however, gray is the color of the sand grains. In some horizons reddish brown mottles and concretions indicate the segregation of iron and a fluctuating water table.

The translocation of silicate clay, colloidal organic material, and iron oxides has contributed to horizon differentiation in many of the soils in the county. This process has occurred, for example, in soils that have a light colored, leached E horizon or a Bt or Bh horizon in which sand grains are bridged and coated with clay or in which colloidal organic matter or a few patchy clay films are on faces of peds and in root channels. The translocation of silicate clay is the most important process of soil formation in Sarasota County.

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Glossary

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as—

Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	more than 12

Base saturation. The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, K), expressed as a percentage of the total cation-exchange capacity.

Bedding. A method of controlling excess water in areas of soils used for cultivated crops and tree crops. The surface soil is plowed into regularly spaced elevated beds, and the crops are planted on the beds. The ditches between the beds drain the excess water.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bisequum. Two sequences of soil horizons, each of which consists of an illuvial horizon and the overlying eluvial horizons.

Calcareous soil. A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

Capillary water. Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity but is more precise in meaning.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Climax vegetation. The stabilized plant community on a particular site. The plant cover reproduces itself and does not change so long as the environment remains the same.

Coarse fragments. If round, mineral or rock particles 2 millimeters to 25 centimeters (10 inches) in diameter; if flat, mineral or rock particles (flagstone) 15 to 38 centimeters (6 to 15 inches) long.

Coarse textured soil. Sand or loamy sand.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.

Conservation tillage. A tillage system that does not invert the soil and that leaves a protective amount of crop residue on the surface throughout the year.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.
Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.
Sticky.—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.
Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.
Soft.—When dry, breaks into powder or individual grains under very slight pressure.
Cemented.—Hard; little affected by moistening.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Corrosive. High risk of corrosion to uncoated steel or deterioration of concrete.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Decreasers. The most heavily grazed climax range plants. Because they are the most palatable, they are the first to be destroyed by overgrazing.

Deferred grazing. Postponing grazing or resting grazing land for a prescribed period.

Depth to rock (in tables). Bedrock is too near the surface for the specified use.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:
Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.
Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.
Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.
Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically they are wet long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.
Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.
Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.
Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients.

Drainage, surface. Runoff, or surface flow of water, from an area.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Eolian soil material. Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic)—Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated)—Erosion much more rapid than geologic erosion, mainly as a result of the activities of man or other animals or of a catastrophe in nature, such as fire, that exposes the surface.

Excess fines (in tables). Excess silt and clay in the soil. The soil is not a source of gravel or sand for construction purposes.

Excess salts (in tables). Excess water-soluble salts in the soil that restrict the growth of most plants.

Excess sulfur (in tables). Excessive amount of sulfur in the soil. The sulfur causes extreme acidity if the soil is drained, and the growth of most plants is restricted.

Fast intake (in tables). The movement of water into the soil is rapid.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Fibric soil material (peat). The least decomposed of all organic soil material. Peat contains a large amount of well preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity.*

Fine textured soil. Sandy clay, silty clay, and clay.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Forb. Any herbaceous plant that is not a grass or a sedge.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors and mottles.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Ground water (geology). Water filling all the unblocked pores of underlying material below the water table.

Hardpan. A hardened or cemented soil horizon, or layer. The soil material is sandy, loamy, or clayey and is cemented by iron oxide, silica, calcium carbonate, or other substance.

Hemic soil material (mucky peat). Organic soil material intermediate in degree of decomposition between the less decomposed fibric and the more decomposed sapric material.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the *Soil Survey Manual.* The major horizons of mineral soil are as follows:

O horizon.—An organic layer of fresh and decaying plant residue at the surface of a mineral soil.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an O, A, or E horizon. The B horizon is, in part, a layer of transition from the overlying horizon to the underlying C horizon. The B horizon also has distinctive characteristics, such as accumulation of clay, sesquioxides, humus, or a combination of these; prismatic or blocky structure; redder or browner colors than those in the A horizon; or a combination of these. The combined A and B horizons are generally called the solum, or true soil. If a soil does not have a B horizon, the A horizon alone is the solum.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the A or B horizon. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, the Arabic numeral 2 precedes the letter C.

Cr horizon.—Soft, unconsolidated bedrock beneath the soil.

R layer.—Consolidated rock (unweathered bedrock) beneath the soil. The rock commonly underlies a C horizon, but can be directly below an A or a B horizon.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Increasers. Species in the climax vegetation that increase in amount as the more desirable plants are reduced by close grazing. Increasers commonly are the shorter plants and the plants that are the less palatable to livestock.

Infiltration. The downward entry of water into the immediate surface of soil or other material. This contrasts with percolation, which is movement of water through soil layers or material.

Infiltration capacity. The maximum rate at which water can infiltrate into a soil under a given set of conditions.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Intake rate. The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake in inches per hour is expressed as follows:

Less than 0.2	very low
0.2 to 0.4	low
0.4 to 0.75	moderately low
0.75 to 1.25	moderate
1.25 to 1.75	moderately high
1.75 to 2.5	high
More than 2.5	very high

Invaders. On range, plants that encroach into an area and grow after the climax vegetation has been reduced by grazing. Generally, invader plants follow disturbance of the surface.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are—

Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

Drip (or trickle).—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler.—Water is sprayed over the surface through pipes or nozzles from a pressure system.

Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

Leaching. The removal of soluble material from soil or other material by percolating water.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Low strength. The soil is not strong enough to support loads.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Moderately coarse textured soil. Coarse sandy loam, sandy loam, and fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, and silty clay loam.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few, common,* and *many*; size—*fine, medium,* and *coarse*; and contrast—*faint, distinct,* and *prominent.* The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium,* from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse,* more than 15 millimeters (about 0.6 inch).

Muck. Dark, finely divided, well decomposed organic soil material. (See Sapric soil material.)

Munsell notation. A designation of color by degrees of three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color of 10YR hue, value of 6, and chroma of 4.

Neutral soil. A soil having a pH value between 6.6 and 7.3. (See Reaction, soil.)

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter. Plant and animal residue in the soil in various stages of decomposition.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The downward movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil adversely affects the specified use.

Permeability. The quality of the soil that enables water to move through the profile. Permeability is measured as the number of inches per hour that water moves through the saturated soil. Terms describing permeability are:

Very slow	less than 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management. For example, slope, stoniness, and thickness.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Subsurface tunnels or pipelike cavities are formed by water moving through the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range in moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poor filter (in tables). Because of rapid permeability, the soil may not adequately filter effluent from a waste disposal system.

Poorly graded. Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Range condition. The present composition of the plant community on a range site in relation to the potential natural plant community for that site. Range condition is expressed as excellent, good, fair, or poor, on the basis of how much the present plant community has departed from the potential.

Rangeland. Land on which the potential climax vegetation is predominantly grasses, grasslike plants, forbs, or shrubs suitable for grazing or browsing. It includes natural grasslands, savannas, many wetlands, some deserts, tundras, and areas that support certain forb and shrub communities.

Range site. An area of rangeland where climate, soil, and relief are sufficiently uniform to produce a distinct natural plant community. A range site is the product of all the environmental factors responsible for its development. It is typified by an association of species that differ from those on other range sites in kind or proportion of species or total production.

Reaction, soil. A measure of the acidity or alkalinity of a soil expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are—

Extremely acid	below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Relief. The elevations or inequalities of a land surface, considered collectively.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Salty water (in tables). Water that is too salty for consumption by livestock.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sapric soil material (muck). The most highly decomposed of all organic soil material. Muck has the least amount of plant fiber, the highest bulk density, and the lowest water content at saturation of all organic soil material.

Seepage (in tables). The movement of water through the soil adversely affects the specified use.

Sequum. A sequence consisting of an illuvial horizon and the overlying eluvial horizon. (See Eluviation.)

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the substratum. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silica. A combination of silicon and oxygen. The mineral form is called quartz.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Sinkhole. A depression in the landscape where limestone has been dissolved.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75 feet.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Slow refill (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.

Small stones (in tables). Rock fragments less than 3 inches (7.6 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the substratum. The living roots and plant and animal activities are largely confined to the solum.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Substratum. The part of the soil below the solum.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Thin layer (in tables). Otherwise suitable soil material too thin for the specified use.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Urban land. Land that is covered by streets, parking lots, buildings, and other urban structures.

Weathering. All physical and chemical changes produced by atmospheric agents in rocks or other deposits at or near the earth's surface. These changes result in disintegration and decomposition of the material.

Well graded. Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. This contrasts with poorly graded soil.

Tables

TABLE 1.--TEMPERATURE AND PRECIPITATION

Month	Temperature			Average precipitation
	Average	Daily maximum	Daily minimum	
Recorded in the period 1951-80 at Bradenton, Florida				
	°F	°F	°F	In
January	61.5	71.2	47.9	2.63
February	62.5	72.2	48.7	2.78
March	66.2	77.7	53.8	2.34
April	70.7	83.0	58.5	2.31
May	75.6	87.9	64.3	3.06
June	79.8	90.7	69.2	6.90
July	80.8	92.3	71.2	9.73
August	81.2	91.8	71.7	9.58
September	80.0	89.3	70.6	7.64
October	74.5	83.4	64.3	3.39
November	67.2	77.2	55.8	1.89
December	62.6	72.2	49.8	2.35
Year	71.8	82.4	60.5	54.60
Recorded in the period 1951-80 at Punta Gorda, Florida				
January	64.1	74.8	53.4	1.90
February	65.4	76.5	54.3	2.27
March	68.3	79.3	57.2	2.52
April	73.2	84.4	62.0	2.37
May	77.6	88.6	66.4	3.67
June	80.7	90.4	70.9	8.09
July	81.8	91.1	72.5	7.44
August	82.1	91.5	72.7	7.37
September	81.0	89.8	72.1	8.26
October	75.8	84.2	67.3	3.81
November	69.6	80.0	59.1	1.52
December	65.0	83.9	54.2	1.61
Year	73.7	83.9	63.5	50.83

TABLE 2.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
2	Beaches	683	0.2
3	Boca and Hallandale soils	1,273	0.3
4	Bradenton fine sand	8,470	2.3
5	Bradenton fine sand, frequently flooded	546	0.1
6	Canaveral fine sand, 0 to 5 percent slopes	3,587	1.0
7	Cassia fine sand	3,556	1.0
8	Delray fine sand, depressional	9,094	2.6
9	Delray and Astor soils, frequently flooded	2,018	0.6
10	EauGallie and Myakka fine sands	167,933	45.8
11	Felda fine sand	1,844	0.5
12	Felda fine sand, depressional	14,063	3.8
13	Felda and Pompano fine sands, frequently flooded	2,021	0.6
14	Floridana mucky fine sand	1,268	0.3
15	Floridana and Gator soils, depressional	6,394	1.7
16	Floridana and Gator soils, frequently flooded	748	0.2
17	Gator muck	1,450	0.4
21	Ft. Green fine sand	4,497	1.2
22	Holopaw fine sand, depressional	57,385	15.6
24	Kesson and Wulfert mucks, frequently flooded	2,773	0.8
25	Malabar fine sand	2,922	0.8
26	Manatee loamy fine sand, depressional	2,571	0.7
27	Matlacha gravelly sand	457	0.1
29	Orsino fine sand	2,060	0.6
30	Ona fine sand	3,124	0.9
31	Pineda fine sand	44,910	12.2
32	Pits and Dumps	645	0.2
33	Pomello fine sand	8,156	2.2
34	Pompano fine sand, depressional	1,006	0.3
36	Pople fine sand	4,016	1.1
38	Smyrna fine sand	891	0.2
39	St. Augustine fine sand	341	0.1
40	Tavares fine sand	1,072	0.3
41	Wabasso fine sand	3,766	1.0
	Water areas less than 40 acres in size	1,270	0.3
	Total	366,810	100.0

TABLE 3.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE

[Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil]

Map symbol and soil name	Land capability	Oranges	Grapefruit	Tomatoes	Cabbage	Pasture
		Boxes	Boxes	Tons	Crates	AUM*
2--------------- Beaches	VIIIw	---	---	---	---	---
3--------------- Boca and Hallandale	IIIw, IVw	---	---	16	---	6.4
4--------------- Bradenton	IIIw	450	575	---	---	9.0
5--------------- Bradenton	Vw	---	---	---	---	8.0
6--------------- Canaveral	VIs	---	---	---	---	---
7--------------- Cassia	VIs	---	---	---	---	6.0
8--------------- Delray	VIIw	---	---	---	---	---
9--------------- Delray and Astor	VIw	---	---	---	---	---
10-------------- EauGallie and Myakka	IVw	365	565	11	280	8.5
11-------------- Felda	IIIw	425	575	8	250	8.0
12-------------- Felda	VIIw	---	---	---	---	---
13-------------- Felda and Pompano	Vw, VIw	---	---	---	---	---
14-------------- Floridana	IIIw	---	---	14	---	10.0
15-------------- Floridana and Gator	VIIw	---	---	---	---	---
16-------------- Floridana and Gator	Vw, VIIw	---	---	---	---	---
17-------------- Gator	IIIw	---	---	---	350	---
21-------------- Ft. Green	IIIw	---	---	---	---	---

See footnote at end of table.

TABLE 3.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Map symbol and soil name	Land capability	Oranges	Grapefruit	Tomatoes	Cabbage	Pasture
		Boxes	Boxes	Tons	Crates	AUM*
22--------------- Holopaw	VIIw	---	---	---	---	---
24--------------- Kesson and Wulfert	VIIIw	---	---	---	---	---
25--------------- Malabar	IVw	325	525	13	200	8.0
26--------------- Manatee	VIIw	---	---	---	---	---
27--------------- Matlacha	VIs	---	---	---	---	---
29--------------- Orsino	IVs	300	450	---	---	---
30--------------- Ona	IIIw	450	575	13	300	8.5
31--------------- Pineda	IIIw	425	575	13	250	8.0
32--------------- Pits and Dumps	---	---	---	---	---	---
33--------------- Pomello	VIs	---	---	---	---	3.5
34--------------- Pompano	VIIw	---	---	---	---	---
36--------------- Pople	IIIw	425	575	13	300	8.0
38--------------- Smyrna	IVw	400	575	13	200	8.0
39--------------- St. Augustine	VIIs	---	---	---	---	---
40--------------- Tavares	IIIs	425	600	---	---	---
41--------------- Wabasso	IIIw	400	575	13	250	8.0

* Animal-unit-month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

TABLE 4.--WOODLAND MANAGEMENT AND PRODUCTIVITY

[Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available]

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Productivity class*	Trees to plant
3:										
Boca	6W	Slight	Moderate	Moderate	Slight	Moderate	South Florida slash pine	55	6	Slash pine, South Florida slash pine.
							Cabbage palm	---	---	
							Laurel oak	---	---	
Hallandale	3W	Slight	Moderate	Moderate	Moderate	Moderate	South Florida slash pine	35	3	Slash pine, South Florida slash pine.
							Cabbage palm	---	---	
							Laurel oak	---	---	
4 Bradenton	11W	Slight	Moderate	Moderate	Slight	Moderate	Slash pine	90	11	Slash pine, South Florida slash pine.
							Longleaf pine	75	6	
							South Florida slash pine	70	13	
							Live oak	---	---	
							Cabbage palm	---	---	
							Water oak	---	---	
							Laurel oak	---	---	
							Magnolia	---	---	
5 Bradenton	11W	Slight	Severe	Severe	Slight	Moderate	Slash pine	90	11	Slash pine, South Florida slash pine.
							Longleaf pine	75	6	
							South Florida slash pine	70	13	
							Cabbage palm	---	---	
							Sweetgum	---	---	
							Water oak	---	---	
							Laurel oak	---	---	
7 Cassia	8S	Slight	Moderate	Severe	Slight	Moderate	Slash pine	70	8	Slash pine, longleaf pine, South Florida slash pine.
							Longleaf pine	60	4	
							South Florida slash pine	35	3	
							Sand live oak	---	---	
							Sand pine	---	---	
8 Delray	2W	Slight	Severe	Severe	Moderate	Severe	Pondcypress	75	2	**
							Baldcypress	---	---	
							Blackgum	---	---	
							Cabbage palm	---	---	
							Pond pine	---	---	
							Loblollybay gordonia	---	---	
							Red maple	---	---	
							Sweetbay	---	---	

See footnotes at end of table.

TABLE 4.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Productivity class*	Trees to plant
9:										
Delray	11W	Slight	Severe	Severe	Slight	Moderate	Slash pine	90	11	Slash pine, South Florida slash pine.
							Longleaf pine	70	6	
							Sweetgum	90	7	
							South Florida slash pine	55	6	
Astor	6W	Slight	Severe	Severe	Moderate	Severe	Baldcypress	100	6	**
							Sweetgum	---	---	
							Water oak	---	---	
							Cabbage palm	---	---	
							Blackgum	---	---	
							Laurel oak	---	---	
							Red maple	---	---	
10:										
EauGallie	10W	Slight	Moderate	Moderate	Slight	Moderate	Slash pine	80	10	Slash pine, South Florida slash pine.
							Longleaf pine	70	6	
							South Florida slash pine	45	4	
							Live oak	---	---	
							Water oak	---	---	
							Cabbage palm	---	---	
Myakka	8W	Slight	Moderate	Moderate	Moderate	Moderate	Slash pine	70	8	Slash pine, South Florida slash pine.
							Longleaf pine	60	4	
							South Florida slash pine	35	3	
							Live oak	---	---	
							Water oak	---	---	
11 Felda	10W	Slight	Moderate	Severe	Slight	Moderate	Slash pine	80	10	Slash pine, South Florida slash pine.
							Longleaf pine	65	5	
							South Florida slash pine	45	4	
							Laurel oak	---	---	
							Cabbage palm	---	---	
12 Felda	2W	Slight	Severe	Severe	Moderate	Severe	Pondcypress	75	2	**
							Baldcypress	---	---	
							Blackgum	---	---	
							Cabbage palm	---	---	
							Loblollybay gordonia	---	---	
							Red maple	---	---	
							Sweetbay	---	---	

See footnotes at end of table.

TABLE 4.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Productivity class*	Trees to plant
13:										
Felda	10W	Slight	Moderate	Severe	Slight	Moderate	Slash pine	80	10	Slash pine, South Florida slash pine.
							Longleaf pine	65	5	
							South Florida slash pine	45	4	
							Laurel oak	---	---	
							Cabbage palm	---	---	
Pompano	6W	Slight	Severe	Severe	Slight	Moderate	Baldcypress	100	6	**
							Sweetgum	---	---	
							Water oak	---	---	
							Cabbage palm	---	---	
							Laurel oak	---	---	
14 Floridana	11W	Slight	Severe	Severe	Slight	Moderate	Slash pine	90	11	Slash pine, South Florida slash pine.
							South Florida slash pine	55	6	
							Cabbage palm	---	---	
15:										
Floridana	2W	Slight	Severe	Severe	Slight	Severe	Pondcypress	75	2	**
							Baldcypress	---	---	
							Blackgum	---	---	
							Cabbage palm	---	---	
							Carolina ash	---	---	
							Loblollybay gordonia	---	---	
							Red maple	---	---	
							Sweetbay	---	---	
Gator	2W	Slight	Severe	Severe	Severe	Severe	Pondcypress	75	2	**
							Red maple	---	---	
							Cabbage palm	---	---	
							Baldcypress	---	---	
16:										
Floridana	6W	Slight	Severe	Severe	Moderate	Severe	Baldcypress	100	6	**
							Red maple	---	---	
							Sweetgum	---	---	
							Cabbage palm	---	---	
							Laurel oak	---	---	
							Water oak	---	---	
							Pondcypress	---	---	
Gator	6W	Slight	Severe	Severe	Severe	Severe	Baldcypress	100	6	**
							Red maple	---	---	
							Cabbage palm	---	---	
							Pondcypress	---	---	

See footnotes at end of table.

TABLE 4.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Productivity class*	Trees to plant
17: Gator	2W	Slight	Severe	Severe	Severe	Severe	Pondcypress	75	2	**
							Red maple	---	---	
							Baldcypress	---	---	
21: Ft. Green	10W	Slight	Moderate	Severe	Slight	Moderate	Slash pine	80	10	Slash pine, South Florida slash pine.
							Longleaf pine	65	5	
							South Florida slash pine	45	4	
							Cabbage palm	---	---	
22: Holopaw	2W	Slight	Severe	Severe	Moderate	--------	Pondcypress	75	2	**
							Baldcypress	---	---	
							Blackgum	---	---	
							Cabbage palm	---	---	
							Carolina ash	---	---	
							Loblollybay gordonia	---	---	
							Red maple	---	---	
							Sweetbay	---	---	
25: Malabar	10W	Slight	Moderate	Severe	Slight	Moderate	Slash pine	80	10	Slash pine, South Florida slash pine.
							Longleaf pine	70	6	
							South Florida slash pine	45	4	
							Cabbage palm	---	---	
							Live oak	---	---	
							Water oak	---	---	
							Laurel oak	---	---	
26: Manatee	2W	Slight	Severe	Severe	Moderate	Severe	Pondcypress	75	2	**
							Baldcypress	---	---	
							Blackgum	---	---	
							Cabbage palm	---	---	
							Loblollybay gordonia	---	---	
							Red maple	---	---	
							Sweetbay	---	---	
29: Orsino	8S	Slight	Moderate	Severe	Slight	Moderate	Slash pine	70	8	Slash pine, South Florida slash pine, longleaf pine.
							Longleaf pine	60	4	
							Sand pine	70	4	
							South Florida slash pine	35	3	
							Sand live oak	---	---	
							Turkey oak	---	---	
30: Ona	10W	Slight	Moderate	Moderate	Slight	Moderate	Slash pine	80	10	Slash pine, South Florida slash pine.
							Longleaf pine	70	6	
							South Florida slash pine	45	4	
							Live oak	---	---	

See footnotes at end of table.

TABLE 4.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Productivity class*	Trees to plant
31: Pineda	10W	Slight	Moderate	Severe	Slight	Moderate	Slash pine	80	10	Slash pine, South Florida slash pine.
							Longleaf pine	70	6	
							South Florida slash pine	45	4	
							Cabbage palm	---	---	
33: Pomello	8S	Slight	Moderate	Severe	Moderate	Moderate	Slash pine	70	8	Slash pine, South Florida slash pine, longleaf pine.
							Longleaf pine	60	4	
							Sand pine	60	3	
							South Florida slash pine	35	3	
34: Pompano	3W	Slight	Severe	Severe	Moderate	Severe	Pondcypress	75	3	**
							Cabbage palm	---	---	
							Red maple	---	---	
							Blackgum	---	---	
							Loblollybay gordonia	---	---	
							Sweetbay	---	---	
							Baldcypress	---	---	
36: Pople	10W	Slight	Moderate	Severe	Slight	Moderate	Slash pine	80	10	Slash pine, South Florida slash pine.
							Longleaf pine	70	6	
							South Florida slash pine	45	4	
							Live oak	---	---	
							Water oak	---	---	
38: Smyrna	10W	Slight	Moderate	Severe	Slight	Moderate	Slash pine	80	10	Slash pine, South Florida slash pine.
							Longleaf pine	70	6	
							South Florida slash pine	45	4	
							Live oak	---	---	
							Water oak	---	---	
40: Tavares	10S	Slight	Moderate	Moderate	Slight	Moderate	Slash pine	80	10	Slash pine, South Florida slash pine, longleaf pine.
							Longleaf pine	70	6	
							South Florida slash pine	45	4	
							Turkey oak	---	---	
							Bluejack oak	---	---	

TABLE 4.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Productivity class*	Trees to plant
41-----------------Wabasso	10W	Slight	Moderate	Moderate	Slight	Moderate	Slash pine----------	80	10	Slash pine, South Florida slash pine.
							South Florida slash pine---------------	45	4	
							Longleaf pine-------	65	5	
							Live oak------------	---	---	
							Water oak-----------	---	---	
							Cabbage palm--------	---	---	

* Productivity class is the yield in cubic meters per hectare per year calculated at the age of culmination of mean annual increment for fully stocked natural stands.

** Trees to plant are not given for this soil because of the equipment limitation and other management concerns.

TABLE 5.--RANGELAND PRODUCTIVITY

[Only the soils that support rangeland vegetation suitable for grazing are listed]

Map symbol and soil name	Range site	Potential annual production for kind of growing season		
		Favorable	Average	Unfavorable
		Lb/acre	Lb/acre	Lb/acre
3: Boca and Hallandale	South Florida Flatwoods	6,000	4,500	3,000
4: Bradenton	Cabbage Palm Flatwoods	6,000	4,500	3,000
5: Bradenton	Wetland Hardwood Hammock	3,500	2,500	2,000
7: Cassia	Sand Pine Scrub	3,500	2,500	1,500
8: Delray	Freshwater Marshes and Ponds	10,000	7,500	5,000
10: EauGallie and Myakka	South Florida Flatwoods	6,000	4,500	3,000
11: Felda	Slough	8,000	6,000	4,000
12: Felda	Freshwater Marshes and Ponds	10,000	7,500	5,000
15: Floridana and Gator	Freshwater Marshes and Ponds	10,000	7,500	5,000
21: Ft. Green	South Florida Flatwoods	6,000	4,500	3,000
22: Holopaw	Freshwater Marshes and Ponds	10,000	7,500	5,000
25: Malabar	Cabbage Palm Flatwoods	6,000	4,500	3,000
26: Manatee	Freshwater Marshes and Ponds	10,000	7,500	5,000
29: Orsino	Sand Pine Scrub	3,500	2,500	1,500
30: Ona	South Florida Flatwoods	6,000	4,500	3,000
31: Pineda	Slough	8,000	6,000	4,000
33: Pomello	Sand Pine Scrub	3,500	2,500	1,500
36: Pople	Cabbage Palm Flatwoods	6,000	4,500	3,000
38: Smyrna	South Florida Flatwoods	5,500	4,800	3,500

TABLE 5.--RANGELAND PRODUCTIVITY--Continued

Map symbol and soil name	Range site	Potential annual production for kind of growing season		
		Favorable	Average	Unfavorable
		Lb/acre	Lb/acre	Lb/acre
40----------------------- Tavares	Longleaf Pine-Turkey Oak Hills---------	4,000	3,000	2,000
41----------------------- Wabasso	South Florida Flatwoods----------------	6,000	4,500	3,000

TABLE 6.--RECREATIONAL DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "moderate" and "severe." Absence of an entry indicates that the soil was not rated]

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
2: Beaches	Severe: flooding, wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness, flooding.	Severe: wetness, too sandy.	Severe: wetness, droughty, flooding.
3:					
Boca	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.	Severe: wetness, droughty.
Hallandale	Severe: wetness, too sandy.	Severe: wetness, too sandy, depth to rock.	Severe: too sandy, wetness, depth to rock.	Severe: wetness, too sandy.	Severe: wetness, droughty, depth to rock.
4: Bradenton	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.	Severe: wetness.
5: Bradenton	Severe: flooding, wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness, flooding.	Severe: wetness, too sandy.	Severe: wetness, flooding.
6: Canaveral	Severe: wetness, too sandy.	Severe: too sandy.	Severe: too sandy, wetness.	Severe: too sandy.	Severe: droughty.
7: Cassia	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Moderate: wetness, droughty.
8: Delray	Severe: ponding, too sandy.	Severe: ponding, too sandy.	Severe: too sandy, ponding.	Severe: ponding, too sandy.	Severe: ponding.
9:					
Delray	Severe: flooding, wetness, too sandy.	Severe: wetness, too sandy.	Severe: wetness.	Severe: wetness, too sandy.	Severe: wetness, flooding.
Astor	Severe: flooding, wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness, flooding.	Severe: wetness, too sandy.	Severe: wetness, flooding.
10:					
EauGallie	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: wetness, droughty.
Myakka	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.	Severe: wetness.

TABLE 6.--RECREATIONAL DEVELOPMENT--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
11: Felda	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.	Severe: wetness, droughty.
12: Felda	Severe: ponding, too sandy.	Severe: ponding, too sandy.	Severe: too sandy, ponding.	Severe: ponding, too sandy.	Severe: ponding, droughty.
13:					
Felda	Severe: flooding, wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness, flooding.	Severe: wetness, too sandy.	Severe: wetness, droughty, flooding.
Pompano	Severe: flooding, wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness, flooding.	Severe: wetness, too sandy.	Severe: wetness, droughty, flooding.
14: Floridana	Severe: wetness, percs slowly, too sandy.	Severe: wetness, too sandy, percs slowly.	Severe: too sandy, wetness, percs slowly.	Severe: wetness, too sandy.	Severe: wetness.
15:					
Floridana	Severe: ponding, percs slowly, too sandy.	Severe: ponding, too sandy, percs slowly.	Severe: too sandy, ponding, percs slowly.	Severe: ponding, too sandy.	Severe: ponding.
Gator	Severe: ponding, percs slowly, excess humus.	Severe: ponding, excess humus, percs slowly.	Severe: excess humus, ponding, percs slowly.	Severe: ponding, excess humus.	Severe: ponding, excess humus.
16:					
Floridana	Severe: flooding, wetness, percs slowly.	Severe: wetness, too sandy, percs slowly.	Severe: too sandy, wetness, flooding.	Severe: wetness, too sandy.	Severe: wetness, flooding.
Gator	Severe: flooding, wetness, excess humus.	Severe: wetness, excess humus.	Severe: excess humus, wetness, flooding.	Severe: wetness, excess humus.	Severe: wetness, flooding, excess humus.
17: Gator	Severe: ponding, percs slowly, excess humus.	Severe: ponding, excess humus, percs slowly.	Severe: excess humus, ponding, percs slowly.	Severe: ponding, excess humus.	Severe: ponding, excess humus.
21: Ft. Green	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.	Severe: wetness.
22: Holopaw	Severe: ponding, too sandy.	Severe: ponding, too sandy.	Severe: too sandy, ponding.	Severe: ponding, too sandy.	Severe: ponding, droughty.

TABLE 6.--RECREATIONAL DEVELOPMENT--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
24:					
Kesson	Severe: flooding, wetness.	Severe: wetness, excess salt.	Severe: wetness, flooding.	Severe: wetness.	Severe: excess salt, flooding, wetness.
Wulfert	Severe: wetness, excess humus, excess salt.	Severe: flooding, wetness, excess humus.	Severe: excess humus, wetness, flooding.	Severe: wetness, excess humus.	Severe: excess salt, excess sulfur, wetness.
25. Malabar	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.	Severe: wetness, droughty.
26. Manatee	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
27. Matlacha	Severe: too sandy.	Severe: too sandy.	Severe: too sandy, small stones.	Severe: too sandy.	Severe: droughty.
29. Orsino	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
30. Ona	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.	Severe: wetness.
31. Pineda	Severe: wetness, percs slowly, too sandy.	Severe: wetness, too sandy, percs slowly.	Severe: too sandy, wetness, percs slowly.	Severe: wetness, too sandy.	Severe: wetness, droughty.
32:					
Pits.					
Dumps.					
33. Pomello	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
34. Pompano	Severe: ponding, too sandy.	Severe: ponding, too sandy.	Severe: too sandy, ponding.	Severe: ponding, too sandy.	Severe: ponding, droughty.
36. Pople	Severe: wetness, percs slowly, too sandy.	Severe: wetness, too sandy, percs slowly.	Severe: too sandy, wetness, percs slowly.	Severe: wetness, too sandy.	Severe: wetness, droughty.
38. Smyrna	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.	Severe: wetness.
39. St. Augustine	Severe: flooding, too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
40. Tavares	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.

TABLE 6.--RECREATIONAL DEVELOPMENT--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
41-------------------- Wabasso	Severe: wetness, percs slowly, too sandy.	Severe: wetness, too sandy, percs slowly.	Severe: too sandy, wetness, percs slowly.	Severe: wetness, too sandy.	Severe: wetness.

TABLE 7.--WILDLIFE HABITAT

[See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that the soil was not rated]

Map symbol and soil name	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
2: Beaches	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
3:										
Boca	Poor	Fair	Fair	Poor	Poor	Good	Fair	Fair	Poor	Fair.
Hallandale	Poor	Poor	Poor	Poor	Poor	Poor	Poor	Poor	Poor	Poor.
4, 5: Bradenton	Poor	Fair	Fair	Fair	Fair	Poor	Fair	Fair	Fair	Poor.
6: Canaveral	Poor	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
7: Cassia	Very poor.	Poor	Poor	Poor	Fair	Very poor.	Very poor.	Poor	Poor	Very poor.
8: Delray	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Good	Good	Very poor.	Very poor.	Good.
9:										
Delray	Poor	Poor	Fair	Poor	Poor	Good	Good	Poor	Poor	Good.
Astor	Very poor.	Very poor.	Poor	Fair	Poor	Good	Good	Very poor.	Fair	Good.
10:										
EauGallie	Poor	Poor	Fair	Poor	Poor	Poor	Poor	Poor	Poor	Poor.
Myakka	Poor	Fair	Fair	Poor	Poor	Fair	Poor	Fair	Poor	Poor.
11: Felda	Poor	Fair	Fair	Poor	Fair	Fair	Fair	Fair	Poor	Fair.
12: Felda	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Good	Good	Very poor.	Very poor.	Good.
13:										
Felda	Poor	Fair	Fair	Poor	Fair	Fair	Fair	Fair	Poor	Fair.
Pompano	Very poor.	Very poor.	Poor	Fair	Poor	Fair	Fair	Very poor.	Poor	Fair.
14: Floridana	Poor	Poor	Fair	Poor	Poor	Good	Good	Poor	Poor	Good.
15:										
Floridana	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Good	Good	Very poor.	Very poor.	Good.
Gator	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Good	Good	Very poor.	Very poor.	Good.
16:										
Floridana	Very poor.	Poor	Fair	Poor	Poor	Good	Good	Poor	Poor	Good.

TABLE 7.--WILDLIFE HABITAT--Continued

Map symbol and soil name	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
16:										
Gator	Very poor.	Very poor.	Very poor.	Fair	Very poor.	Good	Good	Very poor.	Poor	Good.
17 Gator	Fair	Good	---	---	---	Good	Good	Good	---	Good.
21 Ft. Green	Poor	Fair	Fair	Fair	Fair	Fair	Poor	Fair	Fair	Poor.
22 Holopaw	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Good	Good	Very poor.	Very poor.	Good.
24:										
Kesson	Very poor.	Very poor.	Poor	Very poor.	Very poor.	Fair	Fair	Very poor.	Very poor.	Fair.
Wulfert	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Fair	Fair	Very poor.	Very poor.	Fair.
25 Malabar	Poor	Poor	Poor	Poor	Poor	Fair	Fair	Poor	Poor	Fair.
26 Manatee	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Good	Good	Very poor.	Very poor.	Good.
27 Matlacha										
29 Orsino	Poor	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
30 Ona	Poor	Fair	Fair	Poor	Fair	Fair	Fair	Fair	Fair	Fair.
31 Pineda	Poor	Fair	Fair	Poor	Poor	Good	Fair	Fair	Poor	Fair.
32:										
Pits	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
Dumps	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
33 Pomello	Poor	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
34 Pompano	Very poor.	Very poor.	Poor	Poor	Poor	Good	Good	Very poor.	Poor	Good.
36 Pople	Poor	Fair	Fair	Poor	Poor	Good	Fair	Fair	Poor	Fair.
38 Smyrna	Poor	Fair	Fair	Poor	Fair	Fair	Fair	Fair	Fair	Fair.
39 St. Augustine	Very poor.	Very poor.	Very poor.	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Poor.

TABLE 7.--WILDLIFE HABITAT--Continued

Map symbol and soil name	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
40 Tavares	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
41 Wabasso	Poor	Poor	Poor	Poor	Good	Fair	Poor	Poor	Fair	Poor.

TABLE 8.--BUILDING SITE DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition; it does not eliminate the need for onsite investigation]

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
2----------------- Beaches	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding.	Severe: wetness, droughty, flooding.
3:						
Boca-------------	Severe: depth to rock, cutbanks cave, wetness.	Severe: wetness.	Severe: wetness, depth to rock.	Severe: wetness.	Severe: wetness.	Severe: wetness, droughty.
Hallandale-------	Severe: depth to rock, wetness.	Severe: wetness.	Severe: wetness, depth to rock.	Severe: wetness.	Severe: wetness.	Severe: wetness, droughty, depth to rock.
4----------------- Bradenton	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
5----------------- Bradenton	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding.	Severe: wetness, flooding.
6----------------- Canaveral	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Moderate: wetness.	Severe: droughty.
7----------------- Cassia	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness, droughty.
8----------------- Delray	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
9:						
Delray-----------	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding.	Severe: wetness, flooding.
Astor------------	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding.	Severe: wetness, flooding.
10:						
EauGallie--------	Severe: wetness, cutbanks cave.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, droughty.
Myakka-----------	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
11---------------- Felda	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, droughty.

TABLE 8.--BUILDING SITE DEVELOPMENT--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
12----------------- Felda	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding, droughty.
13:						
Felda------------	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding.	Severe: wetness, droughty, flooding.
Pompano----------	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding.	Severe: wetness, droughty, flooding.
14----------------- Floridana	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
15:						
Floridana--------	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
Gator------------	Severe: cutbanks cave, excess humus, ponding.	Severe: subsides, ponding, low strength.	Severe: subsides, ponding.	Severe: subsides, ponding, low strength.	Severe: subsides, ponding.	Severe: ponding, excess humus.
16:						
Floridana--------	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding.	Severe: wetness, flooding.
Gator------------	Severe: cutbanks cave, excess humus, wetness.	Severe: subsides, flooding, wetness.	Severe: subsides, flooding, wetness.	Severe: subsides, flooding, wetness.	Severe: subsides, wetness, flooding.	Severe: wetness, flooding, excess humus.
17----------------- Gator	Severe: cutbanks cave, excess humus, ponding.	Severe: subsides, ponding, low strength.	Severe: subsides, ponding.	Severe: subsides, ponding, low strength.	Severe: subsides, ponding.	Severe: ponding, excess humus.
21----------------- Ft. Green	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
22----------------- Holopaw	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding, droughty.
24:						
Kesson-----------	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding.	Severe: excess salt, flooding, wetness.
Wulfert----------	Severe: cutbanks cave, excess humus, wetness.	Severe: flooding, wetness, low strength.	Severe: flooding, wetness.	Severe: flooding, wetness, low strength.	Severe: low strength, wetness, flooding.	Severe: excess salt, excess sulfur, wetness.

TABLE 8.--BUILDING SITE DEVELOPMENT--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
25: Malabar	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, droughty.
26: Manatee	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
27: Matlacha	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Severe: droughty.
29: Orsino	Severe: cutbanks cave.	Slight	Moderate: wetness.	Slight	Slight	Severe: droughty.
30: Ona	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
31: Pineda	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, droughty.
32:						
Pits.						
Dumps.						
33: Pomello	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Severe: droughty.
34: Pompano	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding, droughty.
36: Pople	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, droughty.
38: Smyrna	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
39: St. Augustine	Severe: cutbanks cave, wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Moderate: wetness, flooding.	Severe: droughty.
40: Tavares	Severe: cutbanks cave.	Slight	Moderate: wetness.	Slight	Slight	Severe: droughty.
41: Wabasso	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.

TABLE 9.--SANITARY FACILITIES

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "severe," "poor," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition; it does not eliminate the need for onsite investigation]

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
2: Beaches	Severe: flooding, wetness, poor filter.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: seepage, too sandy, wetness.
3:					
Boca	Severe: depth to rock, wetness, poor filter.	Severe: seepage, depth to rock, wetness.	Severe: depth to rock, wetness, too sandy.	Severe: depth to rock, seepage, wetness.	Poor: depth to rock, seepage, too sandy.
Hallandale	Severe: depth to rock, wetness, poor filter.	Severe: seepage, depth to rock, wetness.	Severe: depth to rock, seepage, wetness.	Severe: depth to rock, seepage, wetness.	Poor: depth to rock, seepage, too sandy.
4: Bradenton	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
5: Bradenton	Severe: flooding, wetness.	Severe: seepage, flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, seepage, wetness.	Poor: seepage, too sandy, wetness.
6: Canaveral	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
7: Cassia	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy.
8: Delray	Severe: ponding, poor filter.	Severe: seepage, ponding.	Severe: seepage, ponding, too sandy.	Severe: seepage, ponding.	Poor: seepage, too sandy, ponding.
9:					
Delray	Severe: flooding, wetness.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: seepage, too sandy, wetness.
Astor	Severe: flooding, wetness, poor filter.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: seepage, too sandy, wetness.

TABLE 9.--SANITARY FACILITIES--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
10:					
EauGallie	Severe: wetness.	Severe: wetness, seepage.	Severe: wetness, seepage, too sandy.	Severe: wetness, seepage.	Poor: too sandy, wetness, seepage.
Myakka	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
11 Felda	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
12 Felda	Severe: ponding, poor filter.	Severe: seepage, ponding.	Severe: seepage, ponding, too sandy.	Severe: seepage, ponding.	Poor: seepage, too sandy, ponding.
13:					
Felda	Severe: flooding, wetness.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: seepage, too sandy, wetness.
Pompano	Severe: flooding, wetness, poor filter.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: seepage, too sandy, wetness.
14 Floridana	Severe: wetness, percs slowly, poor filter.	Severe: wetness, seepage.	Severe: wetness.	Severe: wetness, seepage.	Poor: wetness.
15:					
Floridana	Severe: ponding, percs slowly, poor filter.	Severe: seepage, ponding.	Severe: ponding.	Severe: ponding, seepage.	Poor: ponding.
Gator	Severe: ponding, percs slowly, poor filter.	Severe: seepage, excess humus, ponding.	Severe: seepage, ponding.	Severe: seepage, ponding.	Poor: ponding, thin layer.
16:					
Floridana	Severe: flooding, wetness, percs slowly.	Severe: seepage, flooding.	Severe: flooding, wetness.	Severe: flooding, seepage, wetness.	Poor: wetness.
Gator	Severe: flooding, wetness, poor filter.	Severe: seepage, flooding, excess humus.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: wetness, excess humus.

TABLE 9.--SANITARY FACILITIES--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
17------------------ Gator	Severe: ponding, percs slowly, poor filter.	Severe: seepage, excess humus, ponding.	Severe: seepage, ponding.	Severe: seepage, ponding.	Poor: ponding, thin layer.
21------------------ Ft. Green	Severe: wetness, percs slowly.	Severe: seepage, wetness.	Severe: wetness.	Severe: seepage, wetness.	Poor: wetness.
22------------------ Holopaw	Severe: ponding, poor filter.	Severe: seepage, ponding.	Severe: seepage, ponding, too sandy.	Severe: seepage, ponding.	Poor: seepage, too sandy, ponding.
24:					
Kesson-------------	Severe: flooding, wetness, poor filter.	Severe: seepage, flooding, excess humus.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: seepage, too sandy, wetness.
Wulfert------------	Severe: flooding, wetness, poor filter.	Severe: seepage, flooding, excess humus.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: seepage, wetness, excess humus.
25------------------ Malabar	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
26------------------ Manatee	Severe: ponding.	Severe: seepage, ponding.	Severe: ponding.	Severe: ponding.	Poor: ponding.
27------------------ Matlacha	Severe: wetness, poor filter.	Severe: wetness, seepage.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: too sandy, seepage.
29------------------ Orsino	Moderate: wetness.	Severe: seepage.	Severe: seepage, wetness, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
30------------------ Ona	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
31------------------ Pineda	Severe: wetness, percs slowly, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
32:					
Pits.					
Dumps.					

TABLE 9.--SANITARY FACILITIES--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
33------------------ Pomello	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy.
34------------------ Pompano	Severe: ponding, poor filter.	Severe: seepage, ponding.	Severe: seepage, ponding, too sandy.	Severe: seepage, ponding.	Poor: seepage, too sandy, ponding.
36------------------ Pople	Severe: wetness, percs slowly, poor filter.	Severe: seepage, wetness.	Severe: wetness.	Severe: seepage, wetness.	Poor: wetness.
38------------------ Smyrna	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
39------------------ St. Augustine	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy.
40------------------ Tavares	Moderate: wetness.	Severe: seepage.	Severe: seepage, wetness, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
41------------------ Wabasso	Severe: wetness, percs slowly, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.

TABLE 10.--CONSTRUCTION MATERIALS

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition; it does not eliminate the need for onsite investigation]

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
2----- Beaches	Poor: wetness.	Probable-----	Improbable: too sandy.	Poor: too sandy, wetness.
3:				
Boca-----	Poor: depth to rock, thin layer, wetness.	Improbable: thin layer.	Improbable: too sandy.	Poor: too sandy, wetness.
Hallandale-----	Poor: depth to rock, wetness.	Improbable: thin layer.	Improbable: too sandy.	Poor: depth to rock, too sandy, wetness.
4----- Bradenton	Poor: wetness.	Probable-----	Improbable: too sandy.	Poor: too sandy, wetness.
5----- Bradenton	Poor: wetness.	Probable-----	Improbable: too sandy.	Poor: thin layer, wetness.
6----- Canaveral	Fair: wetness.	Probable-----	Improbable: too sandy.	Poor: too sandy.
7----- Cassia	Fair: wetness.	Probable-----	Improbable: too sandy.	Poor: too sandy.
8----- Delray	Poor: wetness.	Improbable: thin layer.	Improbable: too sandy.	Poor: too sandy, wetness.
9:				
Delray-----	Poor: wetness.	Improbable: thin layer.	Improbable: too sandy.	Poor: too sandy, wetness.
Astor-----	Poor: wetness.	Probable-----	Improbable: too sandy.	Poor: too sandy, wetness.
10:				
EauGallie-----	Poor: wetness.	Probable-----	Improbable: too sandy.	Poor: too sandy, wetness.
Myakka-----	Poor: wetness.	Probable-----	Improbable: too sandy.	Poor: too sandy, wetness.
11, 12----- Felda	Poor: wetness.	Probable-----	Improbable: too sandy.	Poor: too sandy, wetness.

TABLE 10.--CONSTRUCTION MATERIALS--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
13:				
Felda	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
Pompano	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
14 Floridana	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy, wetness.
15, 16:				
Floridana	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy, wetness.
Gator	Poor: wetness.	Probable	Improbable: too sandy.	Poor: excess humus, wetness.
17 Gator	Poor: wetness.	Probable	Improbable: too sandy.	Poor: excess humus, wetness.
21 Ft. Green	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy, wetness.
22 Holopaw	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
24:				
Kesson	Poor: wetness.	Probable	Improbable: too sandy.	Poor: excess salt, wetness.
Wulfert	Poor: low strength, wetness.	Probable	Improbable: too sandy.	Poor: excess humus, wetness, excess salt.
25 Malabar	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
26 Manatee	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
27 Matlacha	Fair: wetness.	Probable	Improbable: thin layer.	Poor: too sandy, small stones.
29 Orsino	Good	Probable	Improbable: too sandy.	Poor: too sandy.
30 Ona	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.

TABLE 10.--CONSTRUCTION MATERIALS--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
31: Pineda	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
32:				
Pits.				
Dumps.				
33: Pomello	Fair: wetness.	Probable	Improbable: too sandy.	Poor: too sandy.
34: Pompano	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
36: Pople	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy, wetness.
38: Smyrna	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
39: St. Augustine	Fair: wetness.	Probable	Improbable: too sandy.	Poor: too sandy.
40: Tavares	Good	Probable	Improbable: too sandy.	Poor: too sandy.
41: Wabasso	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.

TABLE 11.--WATER MANAGEMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "moderate" and "severe." Absence of an entry indicates that the soil was not evaluated. The information in this table indicates the dominant soil condition; it does not eliminate the need for onsite investigation]

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
2------------------ Beaches	Severe: seepage.	Severe: seepage, wetness.	Severe: cutbanks cave.	Flooding, slope, cutbanks cave.	Wetness, droughty, fast intake.	Wetness, too sandy, soil blowing.	Wetness, droughty.
3:							
Boca------------	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: depth to rock, cutbanks cave.	Depth to rock, cutbanks cave.	Wetness, droughty, fast intake.	Depth to rock, wetness, too sandy.	Wetness, droughty, depth to rock.
Hallandale-------	Severe: depth to rock.	Severe: seepage, piping, wetness.	Severe: depth to rock, cutbanks cave.	Depth to rock, cutbanks cave.	Wetness, droughty, fast intake.	Depth to rock, wetness, too sandy.	Wetness, droughty, depth to rock.
4------------------ Bradenton	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, too sandy.	Wetness, droughty.
5------------------ Bradenton	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: slow refill, cutbanks cave.	Cutbanks cave, flooding.	Wetness, droughty, fast intake.	Wetness, too sandy, soil blowing.	Wetness, droughty.
6------------------ Canaveral	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, too sandy, soil blowing.	Wetness, droughty.
7------------------ Cassia	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, too sandy, soil blowing.	Droughty.
8------------------ Delray	Severe: seepage.	Severe: seepage, ponding.	Severe: cutbanks cave.	Ponding, cutbanks cave.	Ponding, droughty, fast intake.	Ponding, too sandy, soil blowing.	Wetness, droughty.
9:							
Delray-----------	Severe: seepage.	Severe: seepage, wetness.	Severe: cutbanks cave.	Flooding, cutbanks cave.	Wetness, droughty, fast intake.	Wetness, too sandy, soil blowing.	Wetness, droughty.

TABLE 11.--WATER MANAGEMENT--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
9:							
Astor	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Flooding, cutbanks cave.	Wetness, fast intake, soil blowing.	Wetness, too sandy, soil blowing.	Wetness.
10:							
EauGallie	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Fast intake, wetness, droughty.	Wetness, too sandy, soil blowing.	Wetness, droughty.
Myakka	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty.	Wetness, too sandy, soil blowing.	Wetness, droughty.
11 Felda	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, too sandy, soil blowing.	Wetness, droughty.
12 Felda	Severe: seepage.	Severe: seepage, piping, ponding.	Severe: cutbanks cave.	Ponding, cutbanks cave.	Ponding, droughty, fast intake.	Ponding, too sandy, soil blowing.	Wetness, droughty.
13:							
Felda	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Flooding, cutbanks cave.	Wetness, droughty, fast intake.	Wetness, too sandy, soil blowing.	Wetness, droughty.
Pompano	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Flooding, cutbanks cave.	Wetness, droughty, fast intake.	Wetness, too sandy, soil blowing.	Wetness, droughty.
14 Floridana	Severe: seepage.	Severe: wetness.	Severe: slow refill, cutbanks cave.	Percs slowly	Wetness, fast intake.	Wetness, soil blowing, percs slowly.	Wetness, percs slowly.
15:							
Floridana	Severe: seepage.	Severe: ponding.	Severe: slow refill, cutbanks cave.	Ponding, percs slowly.	Ponding, fast intake, soil blowing.	Ponding, soil blowing, percs slowly.	Wetness, percs slowly.
Gator	Severe: seepage.	Severe: piping, ponding.	Severe: slow refill, cutbanks cave.	Ponding, percs slowly, subsides.	Ponding, soil blowing, percs slowly.	Ponding, soil blowing, percs slowly.	Wetness, percs slowly.

TABLE 11.--WATER MANAGEMENT--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
16:							
Floridana--------	Severe: seepage.	Severe: wetness.	Severe: slow refill, cutbanks cave.	Percs slowly, flooding.	Wetness, fast intake, soil blowing.	Wetness, soil blowing, percs slowly.	Wetness, percs slowly.
Gator------------	Severe: seepage.	Severe: excess humus, wetness.	Severe: cutbanks cave.	Flooding, subsides.	Wetness, flooding, soil blowing.	Wetness, soil blowing.	Wetness.
17---------------- Gator	Severe: seepage.	Severe: piping, ponding.	Severe: slow refill, cutbanks cave.	Ponding, percs slowly, subsides.	Ponding, soil blowing, percs slowly.	Ponding, soil blowing, percs slowly.	Wetness, percs slowly.
21---------------- Ft. Green	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: slow refill, cutbanks cave.	Wetness, cutbanks cave, soil blowing.	Wetness, fast intake, soil blowing.	Wetness, soil blowing, percs slowly.	Wetness, percs slowly.
22---------------- Holopaw	Severe: seepage.	Severe: seepage, piping, ponding.	Severe: cutbanks cave.	Ponding, cutbanks cave.	Ponding, droughty, fast intake.	Ponding, too sandy, soil blowing.	Wetness, droughty.
24:							
Kesson-----------	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: salty water, cutbanks cave.	Flooding, cutbanks cave, excess salt.	Wetness, excess salt.	Wetness, too sandy, soil blowing.	Wetness, excess salt, droughty.
Wulfert----------	Severe: seepage.	Severe: seepage, piping, excess humus.	Severe: salty water, cutbanks cave.	Flooding, subsides, excess salt.	Wetness, soil blowing, flooding.	Wetness, soil blowing.	Wetness, excess salt.
25---------------- Malabar	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, too sandy, soil blowing.	Wetness, droughty.
26---------------- Manatee	Moderate: seepage.	Severe: seepage, piping, ponding.	Severe: cutbanks cave.	Ponding--------	Ponding, fast intake, soil blowing.	Ponding, soil blowing.	Wetness.
27---------------- Matlacha	Severe: seepage.	Severe: seepage, piping.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, too sandy, soil blowing.	Droughty.

TABLE 11.--WATER MANAGEMENT--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
29----------------- Orsino	Severe: seepage.	Severe: seepage, piping.	Severe: cutbanks cave.	Deep to water	Droughty, fast intake, soil blowing.	Too sandy, soil blowing.	Droughty.
30----------------- Ona	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, too sandy.	Wetness, droughty.
31----------------- Pineda	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: slow refill, cutbanks cave.	Percs slowly, cutbanks cave.	Wetness, droughty, fast intake.	Wetness, too sandy, soil blowing.	Wetness, droughty, percs slowly.
32:							
Pits.							
Dumps.							
33----------------- Pomello	Severe: seepage.	Severe: seepage, piping.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, too sandy, soil blowing.	Droughty.
34----------------- Pompano	Severe: seepage.	Severe: seepage, piping, ponding.	Severe: cutbanks cave.	Ponding, cutbanks cave.	Ponding, droughty, fast intake.	Ponding, too sandy, soil blowing.	Wetness, droughty.
36----------------- Pople	Severe: seepage.	Severe: thin layer, wetness.	Severe: slow refill, cutbanks cave.	Percs slowly---	Wetness, droughty, fast intake.	Wetness, soil blowing, percs slowly.	Wetness, droughty, percs slowly.
38----------------- Smyrna	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, too sandy, soil blowing.	Wetness, droughty.
39----------------- St. Augustine	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, too sandy, soil blowing.	Droughty.
40----------------- Tavares	Severe: seepage.	Severe: seepage, piping.	Severe: cutbanks cave.	Deep to water	Droughty, fast intake, soil blowing.	Too sandy, soil blowing.	Droughty.

TABLE 11.--WATER MANAGEMENT--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Limitations for-- Embankments, dikes, and levees	Limitations for-- Aquifer-fed excavated ponds	Features affecting-- Drainage	Features affecting-- Irrigation	Features affecting-- Terraces and diversions	Features affecting-- Grassed waterways
41----------------- Wabasso	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Percs slowly, cutbanks cave.	Wetness, droughty, fast intake.	Wetness, too sandy, soil blowing.	Wetness, droughty, rooting depth.

TABLE 12.--ENGINEERING INDEX PROPERTIES

[The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated]

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
2-Beaches	0-80	Coarse sand, sand, fine sand.	SP	A-1, A-3	0	100	75-100	5-85	0-5	---	NP
3: Boca	0-4	Fine sand	SP, SP-SM	A-3, A-2-4	0	100	100	80-100	2-12	---	NP
	4-22	Sand, fine sand	SP, SP-SM	A-3, A-2-4	0	100	100	80-100	2-12	---	NP
	22-25	Sandy loam, sandy clay loam, fine sandy loam.	SC, SM-SC	A-2, A-6, A-4	0	100	100	80-100	17-40	16-37	5-20
	25-32	Variable	---	---	---	---	---	---	---	---	---
	32-36	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Hallandale	0-4	Sand	SP, SP-SM	A-3	0	100	100	90-100	2-6	---	NP
	4-14	Fine sand, sand	SP, SP-SM	A-3, A-2-4	0	100	100	90-100	2-12	---	NP
	14	Weathered bedrock	---	---	---	---	---	---	---	---	---
4-Bradenton	0-5	Fine sand	SP-SM	A-3, A-2-4	0	100	100	80-100	5-12	---	NP
	5-18	Sand, fine sand	SP-SM	A-3, A-2-4	0	100	100	80-100	5-12	---	NP
	18-62	Sandy loam, fine sandy loam, sandy clay loam.	SC, SM-SC	A-2-4, A-2-6	0	100	100	80-100	20-35	<40	4-18
	62-80	Fine sand, loamy fine sand, fine sandy loam.	SP-SM, SM, SM-SC, SC	A-3, A-2-4, A-2-6	0	100	100	80-100	5-35	<40	NP-18
5-Bradenton	0-5	Fine sand	SP-SM	A-3, A-2-4	0	100	100	80-100	5-12	---	NP
	5-18	Sand, fine sand	SP-SM	A-3, A-2-4	0	100	100	80-100	5-12	---	NP
	18-62	Sandy loam, fine sandy loam, sandy clay loam.	SC, SM-SC	A-2-4, A-2-6	0	100	100	80-100	20-35	<40	4-18
	62-80	Sandy loam, fine sandy loam, sandy clay loam.	SM, SM-SC, SC	A-2-4, A-2-6	0	100	100	80-100	20-35	<40	NP-20
6-Canaveral	0-7	Fine sand	SP	A-3	0	100	100	90-100	1-4	---	NP
	7-80	Fine sand, sand, coarse sand.	SP	A-3	0	70-100	70-95	65-90	1-3	---	NP
7-Cassia	0-20	Fine sand, sand	SP, SP-SM	A-3	0	100	100	90-100	2-7	---	NP
	20-34	Sand, fine sand	SP-SM, SM	A-3, A-2-4	0	100	100	90-100	5-20	---	NP
	34-80	Sand, fine sand	SP, SP-SM	A-3	0	100	100	90-100	2-10	---	NP
8-Delray	0-20	Fine sand	SP-SM, SM, SM-SC	A-3, A-2-4	0	100	100	95-100	5-20	<20	NP-5
	20-54	Fine sand, sand	SP-SM	A-3, A-2-4	0	100	100	95-100	5-12	---	NP
	54-80	Sandy loam, fine sandy loam, sandy clay loam.	SM, SM-SC, SC	A-2-4, A-2-6	0	100	100	95-100	20-35	<40	NP-15

TABLE 12.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
9:											
Delray----------	0-20	Fine sand--------	SP-SM, SM, SM-SC	A-3, A-2-4	0	100	100	95-100	5-20	<20	NP-5
	20-54	Fine sand, sand	SP-SM	A-3, A-2-4	0	100	100	95-100	5-12	---	NP
	54-80	Sandy loam, fine sandy loam, sandy clay loam.	SM, SM-SC, SC	A-2-4, A-2-6	0	100	100	95-100	20-35	<40	NP-15
Astor-----------	0-22	Mucky fine sand, fine sand, sand.	SP-SM, SM	A-3, A-2-4	0	100	100	85-100	5-20	---	NP
	22-80	Sand, fine sand, loamy sand.	SP-SM, SM	A-3, A-2-4	0	100	100	85-100	5-20	---	NP
10:											
EauGallie-------	0-22	Fine sand, sand	SP, SP-SM	A-3	0	100	100	80-98	2-5	---	NP
	22-44	Sand, fine sand	SP-SM, SM	A-3, A-2-4	0	100	100	80-98	5-20	---	NP
	44-48	Sand, fine sand	SP, SP-SM	A-3, A-2-4	0	100	100	80-98	2-12	---	NP
	48-80	Sandy loam, fine sandy loam, sandy clay loam.	SM, SM-SC, SC	A-2-4, A-2-6	0	100	100	80-98	20-35	<40	NP-20
Myakka----------	0-24	Fine sand, sand	SP, SP-SM	A-3	0	100	100	85-100	2-10	---	NP
	24-42	Sand, fine sand	SM, SP-SM	A-3, A-2-4	0	100	100	85-100	5-20	---	NP
	42-80	Sand, fine sand	SP, SP-SM	A-3	0	100	100	85-100	2-10	---	NP
11--------------- Felda	0-22	Fine sand, sand	SP, SP-SM	A-3	0	100	100	90-99	2-5	---	NP
	22-60	Sandy loam, fine sandy loam, sandy clay loam.	SM, SM-SC, SC	A-2-4, A-2-6	0	100	100	90-99	15-35	<40	NP-15
	60-80	Sand, fine sand, loamy sand.	SP, SP-SM	A-3, A-2-4	0	100	100	80-99	2-12	---	NP
12--------------- Felda	0-22	Fine sand, sand	SP, SP-SM	A-3	0	100	100	90-100	2-5	---	NP
	22-60	Sandy loam, fine sandy loam, sandy clay loam.	SM, SM-SC, SC	A-2-4, A-2-6	0	100	100	90-100	15-35	<40	NP-15
	60-80	Sand, fine sand	SP, SP-SM	A-3	0	100	100	90-100	2-5	---	NP
13:											
Felda-----------	0-24	Fine sand, sand	SP, SP-SM	A-3	0	100	100	90-99	2-5	---	NP
	24-65	Sandy loam, fine sandy loam, sandy clay loam.	SM, SM-SC, SC	A-2-4, A-2-6	0	100	100	90-99	15-35	<40	NP-15
	65-80	Sand, fine sand, loamy sand.	SP, SP-SM	A-3, A-2-4	0	100	100	80-99	2-12	---	NP
Pompano---------	0-3	Fine sand--------	SP, SP-SM	A-3, A-2-4	0	100	100	75-100	1-12	---	NP
	3-80	Fine sand, sand	SP, SP-SM	A-3, A-2-4	0	100	100	75-100	1-12	---	NP

TABLE 12.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification Unified	Classification AASHTO	Frag- ments > 3 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
14---------------- Floridana	0-14	Mucky fine sand, fine sand, sand	SP-SM, SM	A-3, A-2-4	0	100	100	80-90	5-25	---	NP
	14-22	Fine sand, sand	SP, SP-SM	A-3	0	100	100	80-90	2-10	---	NP
	22-60	Sandy loam, fine sandy loam, sandy clay loam.	SC, SM-SC	A-2-4, A-2-6	0	100	100	80-95	20-35	20-45	4-28
	60-80	Variable---------	---	---	---	---	---	---	---	---	---
15:											
Floridana-------	0-14	Mucky fine sand, fine sand, sand.	SP-SM, SM	A-3, A-2-4	0	100	100	80-90	5-25	---	NP
	14-36	Sand, fine sand	SP, SP-SM	A-3	0	100	100	80-90	2-10	---	NP
	36-80	Sandy loam, fine sandy loam, sandy clay loam.	SM-SC, SC	A-2-4, A-2-6	0	100	100	85-95	20-35	20-40	7-18
Gator-----------	0-22	Muck-------------	PT	A-8	0	---	---	---	---	---	---
	22-26	Fine sand, loamy sand, loamy fine sand.	SP-SM	A-3, A-2-4	0	100	100	85-100	5-12	---	NP
	26-60	Loam, fine sandy loam, sandy clay loam.	SM-SC, SC, SM	A-2-4, A-2-6	0	100	100	80-99	25-35	<40	NP-15
	60-80	Fine sand--------	SM, SP-SM	A-3, A-2-4	0	100	100	85-100	7-15	---	NP
16:											
Floridana-------	0-14	Mucky fine sand, fine sand, sand.	SP-SM, SM	A-3, A-2-4	0	100	100	80-90	5-25	---	NP
	14-36	Fine sand, sand	SP, SP-SM	A-3	0	100	100	85-95	2-10	---	NP
	36-80	Sandy loam, fine sandy loam, sandy clay loam.	SM-SC, SC	A-2-4, A-2-6	0	100	100	80-95	15-35	20-30	7-16
Gator-----------	0-22	Muck-------------	PT	A-8	0	---	---	---	---	---	---
	22-26	Fine sand, loamy sand, loamy fine sand.	SP-SM	A-3, A-2-4	0	100	100	80-100	5-12	---	NP
	26-60	Sandy clay loam, sandy loam, fine sandy loam.	SM-SC, SC, SM	A-2-4, A-2-6	0	100	100	80-99	25-35	<40	NP-15
	60-80	Fine sand--------	SM, SP-SM	A-3, A-2-4	0	100	100	80-100	7-15	---	NP
17---------------- Gator	0-22	Muck-------------	PT	A-8	0	---	---	---	---	---	---
	22-26	Fine sand, loamy sand, loamy fine sand.	SP-SM	A-3, A-2-4	0	100	100	85-100	5-12	---	NP
	26-60	Loam, fine sandy loam, sandy clay loam.	SM-SC, SC, SM	A-2-4, A-2-6	0	100	100	80-99	25-35	<40	NP-15
	60-80	Fine sand--------	SM, SP-SM	A-3, A-2-4	0	100	100	85-100	7-15	---	NP
21---------------- Ft. Green	0-26	Fine sand, sand	SP, SP-SM	A-3, A-2-4	0	100	100	90-99	2-12	---	NP
	26-38	Cobbly fine sandy loam, cobbly sandy clay loam.	SM, SM-SC, SC	A-2-4, A-2-6	15-30	90-100	90-100	60-75	15-35	<40	NP-15
	38-80	Fine sandy loam, sandy loam, sandy clay loam.	SM, SM-SC, SC	A-2-4	0	100	100	90-100	15-30	<35	NP-10

TABLE 12.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification Unified	Classification AASHTO	Frag- ments > 3 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
22--------------- Holopaw	0-50	Fine sand, sand	SP, SP-SM	A-3	0	100	95-100	70-95	2-10	---	NP
	50-66	Sandy loam, fine sandy loam, sandy clay loam.	SM, SM-SC	A-2-4	0	100	95-100	70-95	15-30	<25	NP-7
	66-80	Loamy sand, loamy fine sand, fine sand.	SM, SP-SM	A-2-4	0	100	95-100	70-95	11-20	---	NP
24: Kesson----------	0-7	Muck-------------	PT	---	0	---	---	---	---	---	NP
	7-80	Sand, fine sand	SP, SP-SM	A-3	0	90-100	90-100	90-100	2-10	---	NP
Wulfert---------	0-38	Muck-------------	PT	---	---	---	---	---	---	---	---
	38-80	Sand, fine sand	SP-SM, SM	A-3, A-2-4	0	100	100	85-100	5-18	---	NP
25--------------- Malabar	0-13	Fine sand, sand	SP, SP-SM	A-3	0	100	100	80-100	2-10	---	NP
	13-45	Sand, fine sand	SP, SP-SM	A-3, A-2-4	0	100	100	80-100	3-12	---	NP
	45-80	Sandy clay loam, fine sandy loam, sandy loam.	SC, SM-SC, SM	A-2, A-4, A-6	0	100	100	80-100	20-40	<35	NP-20
26--------------- Manatee	0-18	Loamy fine sand	SP-SM, SM	A-3, A-2-4	0	100	100	85-100	8-15	---	NP
	18-34	Fine sandy loam, sandy loam.	SM-SC, SC, SM	A-2-4	0	100	100	90-100	18-30	<30	NP-10
	34-42	Fine sandy loam, sandy loam, loamy fine sand.	SM, SM-SC, SC	A-2-4	0	95-100	90-100	85-100	13-30	<30	NP-10
	42-80	Fine sandy loam, sandy loam, loamy fine sand, fine sand.	SM, SM-SC, SC, GM	A-2-4	0-5	60-100	50-100	50-100	13-30	<30	NP-10
27--------------- Matlacha	0-42	Gravelly sand----	SP, SP-SM	A-3	0-15	70-85	70-85	60-80	2-10	---	NP
	42-80	Fine sand--------	SP, SP-SM	A-3	0	100	100	85-100	2-10	---	NP
29--------------- Orsino	0-22	Fine sand, sand	SP	A-3	0	100	100	85-95	1-3	---	NP
	22-80	Sand, fine sand	SP, SP-SM	A-3	0	100	100	85-100	2-10	---	NP
30--------------- Ona	0-6	Fine sand, sand	SP-SM, SP	A-3	0	100	100	85-95	3-10	---	NP
	6-16	Fine sand, sand	SP-SM, SM	A-3, A-2-4	0	100	100	85-95	5-20	---	NP
	16-80	Fine sand, sand	SP-SM, SP	A-3	0	100	100	85-95	3-10	---	NP
31--------------- Pineda	0-22	Fine sand, sand	SP, SP-SM	A-3	0	100	100	80-95	2-8	---	NP
	22-36	Sand, fine sand	SP, SP-SM	A-3	0	100	100	80-95	2-10	---	NP
	36-48	Sandy loam, fine sandy loam, sandy clay loam.	SC, SM-SC, SM	A-2-4, A-2-6	0	100	100	65-95	15-35	<35	NP-20
	48-80	Sand, loamy sand, fine sand.	SP-SM, SM, SP	A-3, A-2-4	0	95-100	90-100	80-95	4-15	---	NP
32: Pits.											
Dumps.											

TABLE 12.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification Unified	Classification AASHTO	Frag- ments > 3 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
33--------------- Pomello	0-48	Fine sand, sand	SP, SP-SM	A-3	0	100	100	60-100	1-8	---	NP
	48-80	Sand, fine sand	SP-SM, SM	A-3, A-2-4	0	100	100	60-100	6-15	---	NP
34--------------- Pompano	0-80	Fine sand, sand	SP, SP-SM	A-3, A-2-4	0	100	100	75-100	1-12	---	NP
36--------------- Pople	0-17	Fine sand, sand	SP, SP-SM	A-3	0	100	100	80-95	2-5	---	NP
	17-28	Sand, fine sand	SP, SP-SM	A-3	0	90-100	90-100	80-90	2-5	---	NP
	28-56	Sandy loam, fine sandy loam, sandy clay loam.	SM-SC, SC	A-2-4, A-2-6	0	85-95	85-95	80-90	15-35	20-30	4-12
	56-80	Loamy sand, sand, fine sand.	SP-SM, SM, SP	A-3, A-2-4	0	90-100	95-100	80-95	4-15	---	NP
38--------------- Smyrna	0-12	Fine sand, sand	SP, SP-SM	A-3, A-2-4	0	100	100	80-100	2-12	---	NP
	12-30	Sand, fine sand	SM, SP-SM	A-3, A-2-4	0	100	100	80-100	5-20	---	NP
	30-80	Sand, fine sand	SP, SP-SM	A-3	0	100	100	80-100	2-10	---	NP
39--------------- St. Augustine	0-35	Fine sand, sand	SP, SP-SM	A-3	0	85-95	80-95	80-90	2-5	---	NP
	35-80	Sand, fine sand, loamy fine sand.	SP-SM, SM	A-3, A-2-4	0	85-95	80-95	80-90	5-15	---	NP
40--------------- Tavares	0-6	Fine sand--------	SP, SP-SM	A-3	0	100	95-100	85-100	2-10	---	NP
	6-80	Sand, fine sand	SP, SP-SM	A-3	0	100	95-100	85-100	2-10	---	NP
41--------------- Wabasso	0-8	Fine sand, sand	SP, SP-SM	A-3	0	100	100	95-100	2-10	---	NP
	8-18	Sand, fine sand, loamy sand.	SP-SM, SM	A-3, A-2-4	0	100	100	95-100	5-20	---	NP
	18-25	Sand, fine sand	SP, SP-SM	A-3	0	100	100	95-100	2-10	---	NP
	25-80	Sandy loam, fine sandy loam, sandy clay loam.	SC, SM-SC	A-2-4, A-2-6	0	100	100	95-100	20-35	20-30	5-13

TABLE 13.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS

[The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Wind erodibility group" and "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated]

Map symbol and soil name	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
2---------------- Beaches	0-80	0-1	---	>6.0	0.03-0.05	---	<2	Low--------	0.05	5	1	<.1
3:												
Boca------------	0-4	1-5	1.30-1.55	6.0-20	0.05-0.10	5.1-8.4	<2	Low--------	0.10	2	1	1-3
	4-22	1-5	1.50-1.60	6.0-20	0.02-0.05	5.1-8.4	<2	Low--------	0.17			
	22-25	14-30	1.55-1.65	0.6-2.0	0.10-0.15	5.1-8.4	<2	Low--------	0.20			
	25-32	---	---	---	---	---	---	-----------	----			
	32-36	---	---	---	---	---	---	-----------	----			
Hallandale------	0-4	0-3	1.20-1.45	6.0-20	0.05-0.10	5.1-6.5	<2	Low--------	0.10	1	1	1-2
	4-14	0-5	1.45-1.65	6.0-20	0.03-0.10	5.6-8.4	<2	Low--------	0.10			
	14	---	---	---	---	---	---	-----------	----			
4---------------- Bradenton	0-5	1-6	1.30-1.50	6.0-20	0.08-0.12	5.6-7.3	<2	Low--------	0.10	5	1	2-8
	5-18	1-6	1.50-1.70	6.0-20	0.03-0.07	5.6-7.3	<2	Low--------	0.20			
	18-62	10-18	1.55-1.70	0.6-2.0	0.10-0.15	6.1-8.4	<2	Low--------	0.24			
	62-80	1-18	1.55-1.70	0.6-6.0	0.03-0.10	7.4-8.4	<2	Low--------	0.24			
5---------------- Bradenton	0-5	1-6	1.30-1.50	6.0-20	0.08-0.12	5.1-7.3	<2	Low--------	0.10	5	1	2-8
	5-18	1-6	1.50-1.70	6.0-20	0.03-0.07	5.1-7.3	<2	Low--------	0.20			
	18-62	10-18	1.55-1.70	0.6-2.0	0.10-0.15	6.1-8.4	<2	Low--------	0.24			
	62-80	8-30	1.55-1.70	0.06-0.6	0.10-0.20	7.4-8.4	<2	Low--------	0.24			
6---------------- Canaveral	0-80	<2	1.25-1.50	>20	0.02-0.05	6.6-8.4	<2	Low--------	0.10	5	1	<2
7---------------- Cassia	0-20	1-4	1.30-1.55	6.0-20	0.03-0.07	4.5-6.0	<2	Low--------	0.10	5	1	<1
	20-34	2-10	1.30-1.55	0.6-6.0	0.10-0.15	4.5-6.0	<2	Low--------	0.15			
	34-80	1-5	1.40-1.60	6.0-20	0.03-0.07	4.5-6.0	<2	Low--------	0.10			
8---------------- Delray	0-20	3-13	1.35-1.45	6.0-20	0.10-0.15	5.6-7.3	<2	Low--------	0.10	5	8	2-5
	20-54	1-7	1.50-1.65	6.0-20	0.05-0.08	6.1-7.3	<2	Low--------	0.10			
	54-80	13-30	1.45-1.60	0.6-6.0	0.10-0.15	6.6-7.8	<2	Low--------	0.24			
9:												
Delray----------	0-20	3-13	1.35-1.45	6.0-20	0.10-0.15	5.6-7.3	<2	Low--------	0.10	5	8	2-8
	20-54	1-7	1.50-1.65	6.0-20	0.05-0.08	6.1-7.3	<2	Low--------	0.10			
	54-80	13-30	1.45-1.60	0.6-6.0	0.10-0.15	6.6-7.8	<2	Low--------	0.24			
Astor-----------	0-22	2-7	1.20-1.55	6.0-20	0.20-0.25	6.1-8.4	<2	Low--------	0.10	5	8	9-15
	22-80	2-7	1.50-1.70	6.0-20	0.05-0.10	6.1-8.4	<2	Low--------	0.10			
10:												
EauGallie-------	0-22	<5	1.25-1.50	6.0-20	0.02-0.07	4.5-6.0	<2	Low--------	0.10	5	1	2-8
	22-44	1-8	1.45-1.60	0.6-6.0	0.15-0.25	4.5-6.5	<2	Low--------	0.15			
	44-48	1-5	1.45-1.65	6.0-20	0.05-0.05	4.5-7.8	<2	Low--------	0.10			
	48-66	13-31	1.55-1.70	0.06-0.6	0.11-0.20	4.5-7.8	<2	Low--------	0.20			
	66-80	1-13	1.45-1.55	0.6-6.0	0.05-0.15	4.5-7.8	<2	Low--------	0.15			
Myakka----------	0-24	1-3	1.25-1.45	6.0-20	0.05-0.15	3.6-6.5	<2	Low--------	0.10	5	1	2-5
	24-42	1-8	1.45-1.60	0.6-6.0	0.10-0.20	3.6-6.5	<2	Low--------	0.15			
	42-80	0-2	1.48-1.70	6.0-20	0.02-0.10	3.6-6.5	<2	Low--------	0.10			

TABLE 13.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Salinity	Shrink- swell potential	Erosion factors K	Erosion factors T	Wind erodi- bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
11---------------- Felda	0-22	1-3	1.40-1.55	6.0-20	0.02-0.05	5.1-7.8	<2	Low--------	0.10	5	1	1-4
	22-60	13-30	1.50-1.65	0.6-6.0	0.10-0.15	6.1-7.8	<2	Low--------	0.24			
	60-80	1-10	1.50-1.65	6.0-20	0.02-0.05	6.1-8.4	<2	Low--------	0.10			
12---------------- Felda	0-22	1-3	1.40-1.55	6.0-20	0.05-0.10	5.1-7.8	<2	Low--------	0.10	4	8	1-4
	22-60	13-30	1.50-1.60	0.6-6.0	0.10-0.15	6.1-7.8	<2	Low--------	0.24			
	60-80	1-3	1.45-1.55	6.0-20	0.02-0.05	5.1-7.8	<2	Low--------	0.10			
13:												
Felda-----------	0-24	1-3	1.40-1.55	6.0-20	0.02-0.05	5.1-7.8	<2	Low--------	0.10	5	8	1-4
	24-65	13-30	1.50-1.65	0.6-6.0	0.10-0.15	6.1-7.8	<2	Low--------	0.24			
	65-80	1-10	1.50-1.65	6.0-20	0.02-0.05	6.1-7.8	<2	Low--------	0.10			
Pompano---------	0-3	0-8	1.20-1.50	6.0-20	0.02-0.05	4.5-7.8	<2	Low--------	0.10	5	8	1-4
	3-80	0-8	1.45-1.65	6.0-20	0.02-0.05	4.5-7.8	<2	Low--------	0.10			
14---------------- Floridana	0-14	3-10	1.30-1.40	6.0-20	0.15-0.20	4.5-8.4	<2	Low--------	0.10	5	1	8-15
	14-22	1-7	1.52-1.58	6.0-20	0.05-0.10	4.5-8.4	<2	Low--------	0.10			
	22-60	15-30	1.60-1.69	<0.2	0.10-0.20	4.5-8.4	<2	Low--------	0.24			
	60-80	---	---	---	---	---	---	-----------	----			
15:												
Floridana-------	0-14	3-10	1.40-1.50	6.0-20	0.10-0.20	4.5-8.4	<2	Low--------	0.10	5	8	6-15
	14-36	1-7	1.50-1.55	6.0-20	0.05-0.10	4.5-8.4	<2	Low--------	0.10			
	36-80	15-30	1.60-1.70	<0.2	0.10-0.20	4.5-8.4	<2	Low--------	0.24			
Gator-----------	0-22	0-1	0.10-0.30	6.0-20	0.30-0.40	3.6-6.0	<2	Low--------	----	---	8	55-85
	22-26	1-2	1.20-1.55	2.0-6.0	0.03-0.05	4.5-6.5	<2	Low--------	0.17			
	26-60	13-20	1.60-1.70	<0.2	0.10-0.15	6.1-8.4	<2	Low--------	0.32			
	60-80	2-4	1.20-1.55	2.0-6.0	0.03-0.05	6.1-8.4	<2	Low--------	0.17			
16:												
Floridana-------	0-14	3-10	1.40-1.50	6.0-20	0.10-0.20	4.5-8.4	<2	Low--------	0.10	5	8	6-15
	14-36	1-7	1.50-1.60	6.0-20	0.05-0.10	4.5-8.4	<2	Low--------	0.10			
	36-80	15-30	1.60-1.70	<0.2	0.10-0.20	4.5-8.4	<2	Low--------	0.24			
Gator-----------	0-22	0-1	0.10-0.30	6.0-20	0.30-0.40	3.6-6.0	<2	Low--------	----	---	8	55-85
	22-26	1-2	1.20-1.55	2.0-6.0	0.03-0.05	4.5-6.5	<2	Low--------	0.17			
	26-60	13-20	1.60-1.70	<0.2	0.10-0.15	6.1-8.4	<2	Low--------	0.32			
	60-80	2-4	1.20-1.55	2.0-6.0	0.03-0.05	6.1-8.4	<2	Low--------	0.17			
17---------------- Gator	0-22	0-1	0.10-0.30	6.0-20	0.30-0.40	3.6-6.0	<2	Low--------	----	---	8	55-85
	22-26	1-2	1.20-1.55	2.0-6.0	0.03-0.05	4.5-6.5	<2	Low--------	0.17			
	26-60	13-20	1.60-1.70	<0.2	0.10-0.15	6.1-8.4	<2	Low--------	0.32			
	60-80	2-4	1.20-1.55	2.0-6.0	0.03-0.05	6.1-8.4	<2	Low--------	0.17			
21---------------- Ft. Green	0-26	2-5	1.25-1.55	6.0-20	0.05-0.10	5.1-7.3	<2	Low--------	0.10	5	1	3-6
	26-38	13-30	1.50-1.65	0.06-0.6	0.10-0.15	5.6-7.3	<2	Low--------	0.15			
	38-80	13-30	1.50-1.65	0.06-0.6	0.12-0.18	5.6-7.3	<2	Low--------	0.24			
22---------------- Holopaw	0-50	1-7	1.35-1.60	6.0-20	0.03-0.10	5.1-7.3	<2	Low--------	0.10	5	8	1-4
	50-66	13-28	1.60-1.70	0.2-2.0	0.10-0.20	5.1-8.4	<2	Low--------	0.20			
	66-80	7-13	1.50-1.60	6.0-20	0.05-0.10	5.1-8.4	<2	Low--------	0.15			
24:												
Kesson----------	0-7	---	0.15-0.35	6.0-20	0.30-0.50	7.4-9.0	>16	Low--------	0.10	5	8	25-35
	7-16	1-4	1.50-1.65	2.0-20	0.05-0.10	7.4-9.0	>16	Low--------	0.10			
	16-30	1-4	1.55-1.70	2.0-20	0.05-0.15	7.4-9.0	>16	Low--------	0.10			
	30-80	2-8	1.45-1.65	2.0-20	0.05-0.15	7.4-9.0	>16	Low--------	0.10			

TABLE 13.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Salinity	Shrink- swell potential	Erosion factors K	Erosion factors T	Wind erodi- bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
24:												
Wulfert	0-30	0-1	0.20-0.40	6.0-20	0.20-0.25	5.6-7.3	>16	---	---	2	8	---
	30-38	1-5	0.30-0.40	6.0-20	0.10-0.15	3.6-7.3	>16	---	---			
	38-80	2-5	1.50-1.60	6.0-20	0.02-0.08	3.6-7.3	>16	Low	0.17			
25 Malabar	0-13	0-4	1.35-1.55	6.0-20	0.03-0.08	5.1-8.4	<2	Low	0.10	5	1	1-2
	13-45	1-5	1.35-1.70	6.0-20	0.05-0.10	5.1-8.4	<2	Low	0.10			
	45-80	12-25	1.55-1.75	<0.2	0.10-0.15	5.1-8.4	<2	Low	0.24			
26 Manatee	0-18	2-8	1.20-1.40	2.0-6.0	0.15-0.20	5.6-7.8	<2	Low	0.10	5	2	4-15
	18-34	10-20	1.50-1.65	0.6-2.0	0.10-0.15	6.6-8.4	<2	Low	0.24			
	34-42	6-20	1.55-1.70	0.6-2.0	0.08-0.15	7.4-8.4	<2	Low	0.24			
	42-80	6-20	1.55-1.70	0.6-2.0	0.08-0.15	7.4-8.4	<2	Low	0.24			
27 Matlacha	0-42	3-8	1.65-1.75	2.0-6.0	0.05-0.08	5.6-8.4	<2	Low	0.10	5	2	---
	42-80	1-2	1.50-1.65	6.0-20	0.03-0.05	5.6-7.3	<2	Low	0.17			
29 Orsino	0-22	<1	1.35-1.55	>20	0.02-0.08	3.6-6.0	<2	Low	0.10	5	1	<1
	22-80	<2	1.35-1.55	>20	0.02-0.08	3.6-6.0	<2	Low	0.10			
30 Ona	0-6	1-7	1.40-1.55	6.0-20	0.10-0.15	3.6-6.0	<2	Low	0.10	5	1	1-5
	6-16	3-8	1.50-1.65	0.6-2.0	0.10-0.15	3.6-6.0	<2	Low	0.15			
	16-80	1-4	1.50-1.65	6.0-20	0.03-0.08	3.6-6.0	<2	Low	0.10			
31 Pineda	0-22	1-6	1.25-1.60	6.0-20	0.05-0.10	4.5-7.3	<2	Low	0.10	5	1	.5-6
	22-36	1-8	1.40-1.70	6.0-20	0.02-0.05	4.5-7.3	<2	Low	0.10			
	36-48	10-25	1.50-1.70	<0.2	0.10-0.15	5.1-8.4	<2	Low	0.24			
	48-80	3-12	1.45-1.60	2.0-6.0	0.02-0.05	5.6-8.4	<2	Low	0.10			
32:												
Pits.												
Dumps.												
33 Pomello	0-48	<2	1.35-1.65	>20	0.02-0.05	4.5-6.0	<2	Low	0.10	5	1	<1
	48-80	<2	1.45-1.60	2.0-6.0	0.10-0.30	4.5-6.0	<2	Low	0.15			
34 Pompano	0-80	0-5	1.30-1.65	6.0-20	0.02-0.05	4.5-7.8	<2	Low	0.10	5	8	1-5
36 Pople	0-17	2-6	1.25-1.45	2.0-20	0.03-0.08	5.6-7.8	<2	Low	0.10	5	1	.5-6
	17-28	4-8	1.30-1.60	2.0-20	0.03-0.08	7.4-8.4	<2	Low	0.17			
	28-56	15-30	1.50-1.70	<0.2	0.10-0.15	7.4-8.4	<2	Low	0.24			
	56-80	5-15	1.45-1.70	0.2-2.0	0.10-0.15	7.4-8.4	<2	Low	0.24			
38 Smyrna	0-12	1-6	1.35-1.45	6.0-20	0.03-0.07	3.6-7.3	<2	Low	0.10	5	1	1-5
	12-30	3-8	1.35-1.45	0.6-6.0	0.10-0.20	3.6-7.3	<2	Low	0.15			
	30-80	1-6	1.50-1.65	6.0-20	0.03-0.07	4.5-5.5	<2	Low	0.10			
39 St. Augustine	0-35	0-2	1.30-1.40	6.0-20	0.02-0.05	6.1-8.4	<2	Low	0.10	5	1	1-3
	35-80	4-12	1.40-1.55	2.0-20	0.05-0.10	6.1-8.4	<2	Low	0.15			
40 Tavares	0-6	0-4	1.25-1.60	>6.0	0.05-0.10	3.6-6.0	<2	Low	0.10	5	1	.5-2
	6-80	0-4	1.40-1.70	>6.0	0.02-0.05	3.6-6.0	<2	Low	0.10			
41 Wabasso	0-8	1-5	1.25-1.45	6.0-20	0.03-0.08	3.6-6.5	<2	Low	0.10	5	1	1-4
	8-18	1-12	1.50-1.75	0.6-2.0	0.10-0.15	4.5-7.3	<2	Low	0.15			
	18-25	2-5	1.40-1.55	6.0-20	0.02-0.05	5.1-8.4	<2	Low	0.10			
	25-80	12-30	1.60-1.75	<0.2	0.10-0.15	5.1-8.4	<2	Low	0.24			

TABLE 14.--SOIL AND WATER FEATURES

["Flooding" and "water table" and terms such as "rare," "brief," and "apparent" are explained in the text. The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated]

Map symbol and soil name	Hydrologic group	Flooding			High water table			Depth to bedrock	Subsidence		Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months		Initial	Total	Uncoated steel	Concrete
					Ft			In	In	In		
2----------------- Beaches	D	Frequent----	Very brief to long.	Jan-Dec	0-6.0	Apparent	Jan-Dec	>60	---	---	---	---
3:												
Boca-------------	B/D	None--------	---	---	0.5-1.5	Apparent	Jun-Oct	24-40	---	---	High-----	Moderate.
Hallandale-------	B/D	None--------	---	---	0.5-1.5	Apparent	Jun-Oct	7-20	---	---	High-----	Low.
4----------------- Bradenton	B/D	None--------	---	---	0-1.0	Apparent	Jun-Oct	>60	---	---	High-----	Low.
5----------------- Bradenton	D	Frequent----	Brief-----	Jun-Nov	0-1.0	Apparent	Jun-Dec	>60	---	---	High-----	Low.
6----------------- Canaveral	C	None--------	---	---	1.0-3.0	Apparent	Jun-Nov	>60	---	---	Moderate	Low.
7----------------- Cassia	C	None--------	---	---	1.5-3.5	Apparent	Jul-Jan	>60	---	---	Moderate	High.
8----------------- Delray	D	None--------	---	---	+2-1.0	Apparent	Jun-Dec	>60	---	---	Moderate	Low.
9:												
Delray-----------	B/D	Frequent----	Very long	Jun-Mar	0-1.0	Apparent	Jun-Mar	>60	---	---	Moderate	Low.
Astor------------	D	Frequent----	Very long	Jun-Jan	0-1.0	Apparent	Jun-Jan	>60	---	---	High-----	Low.
10:												
EauGallie--------	B/D	None--------	---	---	0.5-1.5	Apparent	Jun-Oct	>60	---	---	High-----	Moderate.
Myakka-----------	B/D	None--------	---	---	0.5-1.5	Apparent	Jun-Oct	>60	---	---	High-----	High.
11---------------- Felda	B/D	None--------	---	---	0-1.0	Apparent	Jun-Feb	>60	---	---	High-----	Moderate.
12---------------- Felda	D	None--------	---	---	+2-1.0	Apparent	Jun-Feb	>60	---	---	High-----	High.
13:												
Felda------------	B/D	Frequent----	Brief-----	Jul-Feb	0-1.0	Apparent	Jun-Mar	>60	---	---	High-----	Moderate.
Pompano----------	D	Frequent----	Brief-----	Jun-Nov	0-1.0	Apparent	Jun-Mar	>60	---	---	High-----	Moderate.

TABLE 14.--SOIL AND WATER FEATURES--Continued

Map symbol and soil name	Hydrologic group	Flooding			High water table			Depth to bedrock	Subsidence		Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months		Initial	Total	Uncoated steel	Concrete
					Ft			In	In	In		
14----------------- Floridana	B/D	None---------	---	---	0-1.0	Apparent	Jun-Feb	>60	---	---	Moderate	Low.
15:												
Floridana---------	D	None---------	---	---	+2-1.0	Apparent	Jun-Feb	>60	---	---	Moderate	Low.
Gator-------------	D	None---------	---	---	+2-1.0	Apparent	Jan-Dec	>60	6-14	20-23	High------	High.
16:												
Floridana---------	D	Frequent----	Very long	Jul-Sep	0-1.0	Apparent	Jun-Feb	>60	---	---	Moderate	Low.
Gator-------------	D	Frequent----	Very long	Jun-Apr	0-1.0	Apparent	Jan-Mar	>60	2-6	20-28	High------	High.
17----------------- Gator	D	None---------	---	---	+2-1.0	Apparent	Jan-Dec	>60	6-14	20-23	High------	High.
21----------------- Ft. Green	D	None---------	---	---	0.5-1.5	Apparent	Jun-Sep	>60	---	---	High------	Moderate.
22----------------- Holopaw	D	None---------	---	---	+2-1.0	Apparent	Jun-Feb	>60	---	---	High------	Moderate.
24:												
Kesson------------	D	Frequent----	Very long	Jan-Dec	0-0.5	Apparent	Jan-Dec	>60	---	---	High------	Low.
Wulfert-----------	D	Frequent----	Very long	Jan-Dec	0-0.5	Apparent	Jan-Dec	>60	16-18	24-36	High------	High.
25----------------- Malabar	B/D	None---------	---	---	0-1.0	Apparent	Jun-Feb	>60	---	---	High------	Low.
26----------------- Manatee	D	None---------	---	---	+2-1.0	Apparent	Jun-Feb	>60	---	---	High------	Low.
27----------------- Matlacha	C	None---------	---	---	2.0-3.0	Apparent	Jun-Oct	>60	---	---	High------	Low.
29----------------- Orsino	A	None---------	---	---	3.5-5.0	Apparent	Jun-Dec	>60	---	---	Low-------	Moderate.
30----------------- Ona	B/D	None---------	---	---	0.5-1.5	Apparent	Jun-Nov	>60	---	---	High------	High.
31----------------- Pineda	B/D	None---------	---	---	0-1.0	Apparent	Jun-Feb	>60	---	---	High------	Low.
32:												
Pits.												
Dumps.												

TABLE 14.--SOIL AND WATER FEATURES--Continued

Map symbol and soil name	Hydrologic group	Flooding			High water table			Depth to bedrock	Subsidence		Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months		Initial	Total	Uncoated steel	Concrete
					Ft			In	In	In		
33----------------- Pomello	C	None---------	---	---	2.0-3.5	Apparent	Jul-Nov	>60	---	---	Low-------	High.
34----------------- Pompano	D	None---------	---	---	+2-1.0	Apparent	Jun-Feb	>60	---	---	High------	Moderate.
36----------------- Pople	C/D	None---------	---	---	0-1.0	Apparent	Jun-Oct	>60	---	---	High------	Low.
38----------------- Smyrna	B/D	None---------	---	---	0.5-1.5	Apparent	Jun-Oct	>60	---	---	High------	High.
39----------------- St. Augustine	C	Rare---------	---	---	1.5-3.0	Apparent	Jul-Oct	>60	---	---	High------	High.
40----------------- Tavares	A	None---------	---	---	3.5-6.0	Apparent	Jun-Dec	>60	---	---	Low-------	High.
41----------------- Wabasso	B/D	None---------	---	---	0.5-1.5	Apparent	Jun-Oct	>60	---	---	Moderate	High.

TABLE 15.--CLASSIFICATION OF THE SOILS

Soil name	Family or higher taxonomic class
Astor	Sandy, siliceous, hyperthermic Cumulic Haplaquolls
Boca	Loamy, siliceous, hyperthermic Arenic Ochraqualfs
Bradenton	Coarse-loamy, siliceous, hyperthermic Typic Ochraqualfs
Canaveral	Hyperthermic, uncoated Aquic Quartzipsamments
Cassia	Sandy, siliceous, hyperthermic Typic Haplohumods
Delray	Loamy, siliceous, hyperthermic Grossarenic Argiaquolls
EauGallie	Sandy, siliceous, hyperthermic Alfic Haplaquods
Felda	Loamy, siliceous, hyperthermic Arenic Ochraqualfs
Floridana	Loamy, siliceous, hyperthermic Arenic Argiaquolls
Ft. Green	Loamy, siliceous, hyperthermic Arenic Ochraqualfs
Gator	Loamy, siliceous, euic, hyperthermic Terric Medisaprists
Hallandale	Siliceous, hyperthermic Lithic Psammaquents
Holopaw	Loamy, siliceous, hyperthermic Grossarenic Ochraqualfs
Kesson	Siliceous, hyperthermic Typic Psammaquents
Malabar	Loamy, siliceous, hyperthermic Grossarenic Ochraqualfs
Manatee	Coarse-loamy, siliceous, hyperthermic Typic Argiaquolls
Matlacha	Sandy, siliceous, hyperthermic Alfic Udarents
Myakka	Sandy, siliceous, hyperthermic Aeric Haplaquods
Ona	Sandy, siliceous, hyperthermic Typic Haplaquods
Orsino	Hyperthermic, uncoated Spodic Quartzipsamments
Pineda	Loamy, siliceous, hyperthermic Arenic Glossaqualfs
Pomello	Sandy, siliceous, hyperthermic Arenic Haplohumods
Pompano	Siliceous, hyperthermic Typic Psammaquents
Pople	Loamy, siliceous, hyperthermic Arenic Ochraqualfs
Smyrna	Sandy, siliceous, hyperthermic Aeric Haplaquods
St. Augustine	Sandy, siliceous, hyperthermic Alfic Udarents
Tavares	Hyperthermic, uncoated Typic Quartzipsamments
Wabasso	Sandy, siliceous, hyperthermic Alfic Haplaquods
Wulfert	Sandy or sandy-skeletal, siliceous, euic, hyperthermic Terric Sulfihemists

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